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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

DRAINS AND SEWERS;

INCLUDING THE MANUFACTURE OF

DRAIN TILES AND PIPES.

A.D. 1619–1866.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering, therefore, the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in future editions.

This volume contains Abridgments of Specifications to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological "and Descriptive Index" (*see* List of Works at the end of this book). It is intended, however, to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

This series of Abridgments comprises the inventions relating to the construction of sewers, house drains, and land or agricultural drains, including the construction of the pipes and other conduits for these purposes, as well as the machinery employed for excavating the ground to receive them. Metal pipes, when specifically claimed, and gutters, as well as most pipes made of clay and other plastic materials, are included, together with the machinery for making them; but kilns for drying and firing, and methods of ornamenting them are excluded.

Methods of pulverizing clay preparatory to making "bricks, tiles, and pipes," are not included in this series, nor are machines for making bricks, unless they are claimed as applicable to pipe or drain tile making; but to this latter rule one or two exceptions have been made, where certain machines have been shown as obviously capable of application, and no doubt intended to have been applied to these specific purposes.

Specifications descriptive of methods of utilizing sewage and generally disposing of it, do not appertain to the present series of Abridgments, except in cases where there are additions to or alterations in the form or construction of the sewers. The excluded Specifications will be found abridged in the volume devoted to "Manure." Syphons for delivering water are only included in this series when their application to draining is stated or described.

It having been found necessary, in settling the scope of this series, to include the Abridgments relating to the manufacture of Drain Tiles and Pipes, which before formed a separate series so far as they were published, it is not deemed expedient to continue the publication of that class of inventions separately; and therefore the title of the present series ("Drains and Sewers") is now substituted in the list of volumes of Abridgments for that of the former ("Drain Tiles and Pipes").

B. WOODCROFT.

December, 1874.

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INTRODUCTION.

THE removal of water from ground where it might injure instead of benefit the land, and the provision for a proper discharge of that water, constitute the art of drainage, which has at all times engaged the attention of hydraulic engineers. Remains are still to be found of early and curious Egyptian and Assyrian drainage works. The Romans also devoted a great deal of attention to this subject, and many passages in their writings illustrate their practice in this branch of applied sciences. They were careful to keep their arable lands dry by means of open trenches and there are even grounds for surmising that they used covered drains for the purpose. Their writers on agriculture—Cato, Palladius, Columella, and Pliny—all show that the art of draining was practised by them to a great extent; and some of them give very minute instructions for the formation of drains, and the direction in which they should be carried. The materials which they employed for forming their drains were stones, branches of trees, and even straw. Palladius, in his De Aquæ Ductibus, mentions earthenware tubes, which appear to have been somewhat similar to our draining pipes, but they seem to have been used rather for the conveyance of water from one place to another, than for forming the conduits of drains. Recent inquiries and discoveries have also shown that it is at least several centuries since covered channels of various kinds were in use by British husbandmen for drying their land. In the middle ages, however, this art seems to have been lost sight of, and it was not until about the end of the 16th century, when Dutch engineers commenced the work of draining the lakes of the provinces of North Holland, that any great works of this description were undertaken. These works, however, were only executed in low-lying swampy districts; and it was not until about the end of the last century that attention was practically drawn to the removal of waters from uplands. A most interesting and exceedingly valuable book on the subject, called "The Improver Improved," was given to the public as early as 1652 by Captain Walter Blythe; but his directions do not appear to have been generally adopted, and were ultimately forgotten. In his book Captain Blythe set forth the necessity for trunk drainage and the means of accomplishing it; and the true principles of land drainage are stated as distinctly, and urged as earnestly as by any of our modern writers. The following quotation may be found interesting :—

"A strait watercourse cut a considerable depth, in a thousand " parts of this nation, would be more advantageous than we " are aware of, or I will task myself here to dispute further. " And though many persons are interested therein, and some " will agree, and others will oppose; one creek lyeth on one " side of the river, in one lord's manor, and another lyeth on " the other side, and divers men own the same; why may not " one neighbour change with another when both are gainers? " If not, *why may they not be compelled for their own good " and the commonwealth's advantage?* I daresay thousands " of acres of very rich land may hereby be gained, and possibly many as much more amended, that are almost destroyed; but a law is wanting herein for the present, which " I hope will be supplied if it may appear advancement to the " public; for to private interests it is not possible to be the " least prejudice, when every man hath benefit, and each man " may also have an equall allowance if the least prejudiced. " But a word or two more, and so shall conclude this chapter " —and it is a little to further this improvement through a " great destruction (as some may say); it is the removing or " destroying of all such mills, and none else, as drown and " corrupt more lands than themselves are worth to the commonwealth, and they are such as are kept up or dammed so " high as that they boggyfie all the lands that lye under their " mill-head. Such mills as are of little worth, or are by constant great charges maintained, I advise to be pulled down; " the advance of the land, when the water is let run his " course, and not impounded, will be of far greater value " many times. But in case the mills should be so necessary " and profitable too, and far more than the lands they spoil, I " shall then advise that under thy mill-dam, so many yards " wide from it as may prevent breaking through, thou make a

" very deep trench all along so far as thy lands are putrefied, " and thereinto receive all the issuing, spewing water, and " thereby stop or cut off the feeding of it upon thy meadow, " and carry it away back into thy back-water or false course, " by as deep a trench, cut through the most low and convenient part of thy meads. But put case that thou shouldst " have no convenient fall on that side thy mill-dam, then thou " must make some course, *or plant some trough under thy " mill-dam*, and so carry it under into some lower course that " may preserve it from soaking thy meadows or pastures under " it; and by this means thou maist in a good measure reduce " thy land to good soundness, and probably wholly cure it, " and preserve thy mill also." Though two centuries have passed since the above was written, we still see, as Blythe did, much "gallant land" ruined for want of the very drainage operations which he recommended. Many other instructions are also to be found in his book which might even now be carried out with benefit.

It was towards the end of the last century that Mr. Elkington, a Warwickshire farmer, discovered a plan of draining sloping land, and on his system, which was published in a quarto volume at Edinburgh, most of the draining was for some years done. The honour of this discovery, although usually conferred upon Elkington, has been disputed. In Dr. Nugent's "Travels through Germany," printed in 1768, there is an account of a mode of draining land on principles in some respects of a similar nature; and in a publication by Dr. J. Anderson, entitled, Essays on Agricultural and Rural Affairs in 1775, the author expresses his opinion that "The expense of digging pits might be saved by " boring a hole through the stratum clay with a wimble made " on purpose." There seems no doubt, however, that Mr. Elkington made use of the auger before the date of either of these publications; and the decision of Parliament, which granted him 1,000*l.*, seems to settle the question.

About the year 1823 James Smith, of Deanston, discovered anew Captain Blythe's system, and his exemplifications of those principles of draining in his own practice, and his subsequent publication of them, effected a complete revolution in the art of draining, and mark an era in our agricultural progress.

He insisted on the necessity of providing every field that needed draining at all with a complete system of parallel underground channels, instead of persisting in the attempt to dry them by means of a few dexterous cuts. The distances between drains he showed must be regulated by the greater or less retentiveness of the soil, and he gave 10 feet as the minimum, and 40 feet as the maximum, of these distances.

The whole cultivated lands of Britain being disposed in ridges which usually lie in the line of greatest ascent, it became customary to form the drains in each furrow, or in each alternate, or third or fourth one, as the case might require; and so the system came to be popularly called *furrow draining*. From the number and arrangements of the drains the terms *frequent* and *parallel* were also applied to it; Mr. Smith himself more appropriately named it, from its effects, *thorough draining*. The principles thus put forth by him were speedily adopted, but in many places the cost of procuring stones and of cartage, especially in wet seasons, to a great extent hindered their general adoption. This difficulty led to the substitution of tiles and soles of burned earthenware, but these were for some time both limited in supply and high in price. The opportune invention, however, by he Marquis of Tweeddale of a tile-making machine, followed as it was by a succession of more perfect machines, removed this impediment to agricultural improvement; and since that, the substitution of cylindrical pipe for the original horse-shoe tiles, has still further aided the progress of land-drainage, both by lowering the cost and increasing the efficiency of such works. It is no exaggeration to say that by means of the great improvement in the manufacture of pipes and tiles, and the improvement of draining tools in general, the cost of the operations has been lessened fifty per cent. within the last twenty years.

A still greater stimulus to the improvement of land was given by the passing of Acts of Parliament by which some obstacles were removed which had hindered large works of drainage. By the first of these Acts, passed in 1846, 4,000,000*l*. of public money was advanced to landowners to be expended in draining their lands. By the end of 1854 the whole of this money was allotted, and more than half actually expended. Scottish landowners were so prompt to discern the advantages thus held out, that more than half the amount fell to their share. The success of this Act soon led to the passing of others, by which ample provision is made for rendering any dormant capital of the country available for the improvement of its soil.

There are two great branches of drainage, the drainage by means of open cuts, and the drainage by means of subterranean channels; but there are many kinds of drains, the principal ones being rubble, brick, gravel, wood, spray, straw, turf, wedge, earth and tile drains. There are also pipe and wheel drains. In many cases, as in the central counties of England and in the level plains of Flanders, where the surface is flat, and the soil of a stiff retentive nature, covered drains have proved utterly ineffectual, and the land is relieved from surface water by forming high and broad ridges of twenty, thirty, and even forty feet wide, and having the centre three or four feet more elevated than the furrows. There is also another mode of surface draining practised in the Carse of Gowrie in Perthshire, and it is the only method employed in that extensive and rich district. Large common drains traverse the farms in different directions, and are made of sufficient capacity to receive the water conducted from the fields by the surrounding ditches. These ditches are made so as to suit the particular situation, and are directed and arranged so as to form a communication with every field belonging to the farm. They vary in width from a foot, to a foot and a half at the bottom, and with such a stop as to prevent their sides from falling in. The drains which receive the water from these ditches discharge their contents into the River Tay. In such cases as those of the polders of Holland and a few districts of the east of England, where the natural surface of the land is beneath the mean water level of the surrounding country, it has been found necessary to isolate the land about to be drained, and to prepare an out-fall, into which the waters are raised by artificial means to a level which allows of their subsequent discharge. The Dutch engineers call these out-falls "ring dykes," and generally speaking they raise the drainage waters into them by means of Archimedian screws or dash wheels, worked by windmills of very rude and primitive construction. In the drainage of the Haarlem Lake, however, steam power was resorted to. The out-fall of the ring dyke (which is on an average not less than a hundred and twenty-five feet in width, by ten feet in depth) of the Haarlem

Lake is into the Spaarm, a river falling into the Zuyder Zee, and as the Spaarm is itself frequently closed by high tides or storms, an elaborate system of stop gates and of large steam-pumping engines is provided to ensure the discharge of the land waters during those periods. Very nearly the same principles have been adopted in designing the works lately executed in the fen districts of Cambridgeshire and Lincolnshire.

The drainage of bogs or swamps in mountain districts may often give rise to the application of other laws, as for instance when the water is supplied by springs rising under considerable pressure, or when the swamps of the locality arise from the mere accumulation of water at the wet seasons of the year. The Bog of Allen was an instance of the former condition, and the water was relieved by forming a series of vertical pipes, through which it rose and poured into an outfall drain. The Chat Moss, however, was drained simply by means of open cuts, and by a slight improvement in the outfall. The latter operation, which is also the more simple, is the one more usually required, and there are many thousands of acres of the best land in Europe now unproductive which might be easily brought into cultivation by simply lowering the level of the natural water courses. Much of this, at present, waste land is to be found in the north of Spain, in Switzerland, and in the island of Sardinia.

In its original acceptation the word "sewers" meant simply the bank or sea-weir, erected for the purpose of protecting the low lands by the sides of tidal rivers from the effects of high tides or inundations; but by extension the word has been applied, firstly, to all artificial channels which discharge the surface drainage of lands, and of late years, exclusively to the subterranean artificial water-courses of towns.

The earliest recorded instances of sewers is in the palace of Nimroud, and the more celebrated *cloacæ* of Rome, but none of the drains of this description executed by the ancients were used for the purpose to which they are now applied. The Cloacæ Maxima itself was formed for the purpose of draining the Campus Martius and the low swampy lands between the Seven Hills, exactly as the *égout de ceinture* of Paris drains the valley of the Marais, Menilmontant, and Montmartre of that city; and it is certain that the Romans were never acquainted with the modes of house sewage we have lately applied.

One of the first legislative enactments of modern times relating to this subject was an Act, 9 Henry III. (about 1225), which was followed by several others,—6 Henry VI., 8 Henry VI., 4 Henry VII., and 6 Henry VIII.; and the whole of the legislature was carefully reviewed and condensed by Sir Thomas More in the celebrated "Bill of "Sewers," which became law in 25 Henry VIII., 1531. In France also attention had been directed to the subject of drainage, for in 1412 the *grand égout de ceinture* (called then the *ruisseau de Menilmontant*) was built; and in 1550, Philibert de l'Orme was instructed to examine and improve the drainage of Paris. The Governments of both England and France continued from these periods actively to interfere in the regulation of these works, but, as might almost be expected, essentially different courses were adopted. In the one case, power was handed over to local commissions; in the other, it was retained exclusively in the hands of the central government, the consequences being that in the former case much irregular energy and enterprise were displayed, while in the latter a singular amount of scientific indifference was shown. In England the great evils resulting from the many local boards (there being as many as eight separate commissions in London alone) resulted in the suppression of them all, and in the final transfer of all management of sewerage of the metropolis in 1855 to the Metropolitan Board of Works. In France, the administration of the laws regulating the *égouts*, remains under the control of the Department of Public Works, and the municipalities have practically no control over the matter. The necessity for the much greater interest taken in drainage lately has arisen, not so much because of the defects of the former system, which allowed solid accumulation on the land, but because towns have outgrown their sites and extended their buildings to the clay which so commonly occurs under beds of sand or of gravel. In this manner London has outgrown the limits of its gravel bed, and has been thrown upon the blue clay underlying the stratum of gravel which forms the banks and beds of the Thames in its course through London, and which comes to the surface at from one to two miles inland on each side of the river. As soon as the clay was reached, the necessity of providing for the immediate removal of sewerage became apparent, but in the endeavour to provide for such removal, a system has been carried out which has proved defective in one great particular, the air is liable to be vitiated by the exhalations of the steaming drain, more than by anything emitted from a close cesspool, dry-strained in gravelly soil.

London sewers are unrivalled for extent and construction. Fully one-third of the sewers in the City of London were made in the ten years preceding 1834. A return made by the Westminster Commissioners of Sewers shows that between 1807 and 1834, there had been built within the Ranelagh level 2,692 feet of open, and 6,886 feet of covered sewers at the cost of the Commission; while the length made during the same period by private persons was 91,708 feet. In the Holborn and Finsbury division, 31,000 feet of new sewers were made in that district between 1822 and 1831, at a cost of more than 23,000*l*. In the Tower Hamlets division nearly 25,000 feet of new sewers were proposed in 1834 or 1835, of which four-fifths were completed by 1840. In 1841 the total length of main sewers in the Holborn and Finsbury divisions was 83 miles. All sewers constructed of late years by the Metropolitan Commission are large enough to allow men to pass through them for the purpose of inspecting or cleaning them. The smallest sewers in the City of London division are about four feet three inches high, by two feet three inches wide; the dimensions being increased according to circumstances up to ten feet by eight.

The construction of the larger portion of the Metropolitan main drainage system, with the outfall at Crossness is so recent as to require no further allusion.

DRAINS AND SEWERS.

A.D. 1619, January 12.—N° 11.

ETHERINGTON, John.—"A sp̃iall priviledge graunted to " John Etherington, shewing that whereas he hath found " out the arte of making a certain engine to make and cast " clay, all sort of earthern pipes for conveyance of water in " the earth, and also monions and transomes for windowes, " crests for houses, tyles, and paving stones, His Ma^{tie} doth " hereby grant unto him sole power, for 21 yeares, to make " and use the said engines for the purposes aforesaid—paying " yearelie into His Ma$^{t's}$ Excheq^{r} xxvj^{s} viij^{d}."

[Letters Patent printed, price, 4*d*. No Specification enrolled.]

A.D. 1619, May 23.—N° 13.

SHOTBOLTE, John. — Making and amending highways, pathways, embankments, dams, drains, &c.

"A pfecte, true, & exacte way of makeing, amending, and " repairing our royall high way and roades, as also any other " pticular waies & passages whatsoever; and also for the " speedy erecting, raising, newe making, amending, and " repairing of the moundes & banckes of the sea, greate " rivers, or other waters that may overflowe, surround, or " any way endaunger the waies or any landes or groundes " adioineing or neere to such waters as aforesaid; as alsoe " for the makeing, amending, clensing, scouring, sinking, " making cleane, and repairing of pondes, stanckꝭ, dãmes, " pooles, draines, rivers, and all manner of watercourses " whatsoever, and that by the vse and helpe of certaine " strong way ploughes, way harrowes, land stearnes, scowrers, " trundlers, and other strong and massy engines by him " invented for that and such like pposes." Grant for 21 years upon payment of yearly rent of five marks, "notwithstanding " the not describing the ^{c}'tainty or manner of the working" " or the not nameing or describing the true forme of the

" said way ploughes, way harrowes, land sternes, scourers, " trundlers, and devices to be vsed & ymployed in and aboute " the said workes, and notwithstanding any other defectes & " inc'tainties in the same."

[Letters Patent printed, 4*d*. No Specification enrolled.]

A.D. 1725, June 28.—N° 480.

EDWARDS, William.—" A new method never yet known or " practised for making of pipes with clay or earth for the " conveying of water vnder ground from place to place."

No Specification was enrolled; but the following extract from the Letters Patent, will explain the nature of the invention.

"The said method is performed in manner following, viz^{t}: " That the petitioner having provided a turned piece or plug " of wood, according to the length of the pipe designed, and " having fitted it on a potters wheel, with a ball of clay " prepared for the purpose, and disposed to the bottom of " the plug, which standρ vpright in the center of the potters " wheel the petic̃oner's servant by his directions (after having " made several experimentρ of the said invention) turned up " with his handρ, on an engine contrived for the purpose, " great quantities of pipes, with such expedition that one " wheel could turne off fifteen or twenty dozen of pipes in a " day; that the clay being prepared with a great deal of art, " and ground in a mill by an horse, the petic̃oner cann runn " vp these pipes to the substance of two inches, and to eight " or ten or more inches diameter, if required, in the bore; " after they are dryed to a fitting temper, they are put vpon " a turner's lath, and are shaped with proper tools to what " form and fashion needful, as spicket or otherwaies, so to fit " the boared end of the other pipe with a proper instrument " that they fit with all exactness, so as to admit of little or " no wast of water; but to make them more effectually do " it, the petitioner hath made and invented a cold putty, " that cements and joynes them them with that firmness that " the cement becomes as hard as any the burnt pipes, and " as lasting in or out of water; that in the laying these pipes " *in* the earth (or out of it) the petitioner can make them to " *rise or fall*, and give them any the shortest turnings; that

" besides the naturall strength of the clay, he can hoop
" them with iron hoops or ring hoops made of the same clay
" as the pipes, which will add double strength to them, and
" the petic̃oner believes will throw vp water to any height
" in reason; that the petic̃oner hath made a pump of great
" depth of these pipes, which draws its full quantity of water
" to the size of the bore, and works with all ease and exactness;
" that his said invention is founded vpon great
" experience in the proper preparing and working vp the clay
" for this purpose, the same being wrought by the strength
" of men's hands, and turned vpon an engine contrived so
" admirably that in the working of the clay the pipes shall
" be so firm and strong that it becomes (after the proper
" drying) as solid as any wood; and thus contrived, these
" pipes are turned with that exactness (by an engine) that
" the one end is tapered so as to fit the bore end of the other;
" that nothing can possibly be more exact, and after the
" ioyning (the pipes are then so strong that no strength can
" loose or part them, and will abide all weather and water
" without perishing, they will be of singular vse in carrying
" of water from the tops of houses and buildings; that by
" this new invenc̃on it is apprehended that that it will be of
" generall vse and advantage to Our kingdom, because that
" every county may have such pipes made at their respective
" homes, and which will be of great vse in employing the
" poor of this Our kingdom through all the inland counties
" thereof."

[Letters Patent printed, *4d.* No Specification enrolled.]

A.D. 1728, May 21.—Nº 498.

MOORE, Bryan.—" A new sort of engine or machine for the
" boreing of stone, either free stone or greit stone, either strait,
" square, or circulcular, for pipes, pumps, or other vses, quite
" different from anything hitherto practised for the like vses."

The Letters Patent recite "that the petic̃oner can with the
" said engine bore any such stone from three foot to six foot
" in length, and from an inch & a halfe wide to fourteen inches
" as cheap as wood; that it will be of great service both in
" town and country for the conveying of water wherever lead
" or wood is made use of; that when the stone pipes are once

“ laid they will last five times as long as wood ones, and the
“ petic̃oner can fix new stone pipes to old wood ones.”

Patent granted for 14 years.

[Letters Patent printed, 4*d*. No Specification enrolled.]

A.D. 1734, November 21.—Nº 549.

TUITE, JOHN.—“An engine” “for making stone pipes to
“ convey water, and for making marble and stone coffins.”

“The same is invented for making, boring, or turning stone
“ pipes, and marble coffins; and the said new-invented engine
“ consiss of a large wooden wheell to be turned by wind,
“ water, horse, or men, and which large wheel commands
“ several other lesser wheels, which, together with several
“ inside and outside springs, command severall instruments or
“ bores that work or bore the stone or marble.”

This Patent was extended for another term of 14 years by Act of Parliament.

[Printed, 4*d*. No Drawings. See Mechanics' Magazine, vol. 13, p. 64.]

A.D. 1766, March 25.—Nº 843.

LINDSLEE, THOMAS.—“The said composition for making
“ fictile pipes for the conducting of water, and other fictile
“ wares, and the method of making and burning the same, so
“ as that the same shall be as hard and durable as stone, are
“ as follows (that is to say):—Of pipe clay, mug clay, and
“ flint stones calcined, all three finely ground and sifted,
“ equal quantities; Devonshire clay and Staffordshire clay,
“ finely ground and sifted, of each in the same proportion to
“ the mug clay as two is to five; of Stourbridge clay, mug
“ and stone ware, finely ground and sifted, white sand and
“ glass grinders sand, of each in the same proportion to the
“ mug clay as twenty is to twenty-five; of magnesia, finely
“ ground and sifted, in the same proportion to the white sand
“ as five is to twenty. The several materials aforesaid to be
“ mixed with water to a proper consistence, and after being
“ kneaded with men's feet, or with any proper instrument,
“ machine, or engine, to be formed in tin or iron mouldings;
“ and when sufficiently dry, to be double glazed with the
“ following composition (that is to say):—Of magnesia, red
“ oaker, and yellow oaker, equal parts; of lead oar half as
“ much as magnesia; and of quarte in proportion to the

" magnesia as one is to twenty. The same fictile pipes and
" other wares are to be burnt, in cans made of the same
" materials as the said pipes, in a kiln of a height proportion-
" able to the length of the said pipes and wares, and with
" four mouths."

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 6th Report, p. 159.]

A.D. 1779, May 26.—N° 1225.

MARBELL, Isaac.—" A certain bitumen or fire mastic" useful for "water pipes, conduits," and many other purposes named by the inventor.

The inventor takes one hundred weight of yellow rosin, fifty-six pounds of black rosin, two hundred weight of white stone ground, and fifty-six pounds of lime, making together four hundredweight. These he pulverises, mixes and melts " in a ladle or large iron pan over a good fire till they come " to a liquid form or a proper consistence." He also makes what he calls "Egyptian mastic," thus :—One hundredweight of white stone ground, two hundredweight of brick dust, twenty-eight pounds of quick stone lime "solely for colouring " the same," one and a half hundredweight of plaster of Paris, are all mixed together in the powder and afterwards made into a paste with water. This is for plastering, but if it be required for making bricks or to be used in moulds then the following composition must be used :—One hundredweight of "any " white stone pulverised," three hundred-weight of sand, one hundred weight of "grout of soap boilers," and one hundred weight of clay of any kind.

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 6th Report, p. 164.]

A.D. 1782, June 19.—N° 1330.

GAITTAIT, John.—Stink trap.

This trap "is made of copper, iron, brass, tin, composition, " or earth, and of any shape whatever. . . . . In the side of " this machine or trap is a slit or cavity, of a size and at such " distance from the bottom as is proportioned to the dimen- " sions of the machine. In the inside is soldered or fixed a " partition of the same sort of material that the outside of the " trap is made of. The bottom of this partition, on the in- " side, comes below the slit or cavity in the side of the trap.

" so as to let remain such a quantity of water as to prevent " any smell from coming through, and at the same time does " not dry away or leave it empty for a considerable time, " supposing no fresh water is thrown into it. This machine " or stink trap is let into lead or any other sort of pipes that " are made, and also into stone or any other kind of sinks. " It has a top, with several holes in it, which is made of cast-" iron, and the trap being let into the pipe or sink, so as there " be a kind of groove to let the top of the tray lay flush or " even with the bottom of the sink or closet where the water " is thrown down, and is either fastened by soldering, or left " loose to be taken up at pleasure."

[Printed, 4*d*. No Drawings.]

A.D. 1783, May 3.—N° 1366.

DRIVER, WILLIAM.—A machine for cutting canals, trenches, &c.

The machine consists of a "three-wheeled cart or carriage, " under which is placed an engine nearly like a common " plough." As this machine is drawn forward, the plough breaks up the earth, and turns the stuff into the cavities of a " loading wheel," by which the earth is put into the cart. Flaps or doors are provided in the cart bottom to facilitate unloading.

The Specification describes the invention by reference to a drawing, which, however, is not on the roll.

[Printed, 4*d*. Drawing referred to but not on Roll.]

A.D. 1791, May 11.—N° 1805.

WYATT, CHARLES.—Making pipes, spouts, troughs, &c.

The invention consists in making the above articles "of " sheets or plates of metal, sold under and known by the name " of tinned copper sheets, which sheets or plates consist of " copper or brass, or a compound metal of which copper is " the basis, covered and combined with tin or lead, or a semi-" metal, or a compound of two or more of those substances." These sheets form the subject of a Patent granted to the present inventor and William Collins on 13th March, A.D. 1790.

The plates are cut, bent, and united by soldering or riveting.

[Printed, 4*d*. No Drawings.]

A.D. 1798, August 3.—N° 2253.

DOCKER, William.—"Making pipes or tubes out of solid "block of stone."

These pipes for "conveying of water, smoke, steam and "other fluids" "are made out of solid blocks of stone, by "boaring the said solid block of stone with different center "bits of the diameter wanted, which may be effected either "by manual labour, or by engines made for the purpose, and "when so bored the joints of the pipes or tubes must be "affixed together," "which joints must be made so fine as not "to admit of being cemented with a substance thicker than "paint, in consequence of which the same will be equal to "one solid or entire pipe."

Various forms of joint are shown in the drawing. They are all socket joints.

[Printed, 6*d*. Drawing.]

A.D. 1802, December 21.—N° 2672.

SCOTT, John, CLARKSON, James, TATHAM, William, and MELLISH, Samuel.—Using "clumps" for the purpose of constructing water pipes, sewers, tunnels, wells, conduits, reservoirs, or other circular walls, shells, or buildings. These clumps are composed of earth, stone, clay, plaster, cements, compositions, kiln-burnt material, masonry, or any other suitable material. They are so formed "that the sides or edges "thereof, when made and compleated, shall join and fit to "each other on an exact radius of a circle, terminating of its "centre; so that when all the said parts are put together, "with or without mortar or cement, the said several clumps "will form a direct circle, bearing pressure inwards on the "principal of an arch; and that when the several layers, "courses, or distinct circles thereof shall be fitted and adjusted in their proper places, such will form what is termed "a broken joint in the wall or shell, so that the same will "alternately clamp or join the courses next adjacent to them "together, to prevent their removal sideways,"—such clamping or interlocking being effected by a curved projection on one of the flat sides of each clump entering a corresponding recess in the side of the clump above or below the same.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 2 (second series), p. 333.]

A.D. 1805, March 30.—Nº 2837.

WRIGHT, Sir GEORGE.—"Cutting out of solid stone, wood, "or other materials, pillars or tubes, either cylindrical or "conical."

The inventor proposes to make, by this apparatus, "pipes, "arches, arches for sewers," and other things.

A hole is first drilled through the block of stone or wood, through which is passed a bar supporting a frame, which in its turn carries the saw. Thus the bar is the centre round which the saw works. Or other centres may be used outside the stone, by which the drilling is rendered unnecessary. Or, again, an annular template may be secured against the end of the block to serve as a guide for the saw.

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 8 (*second series*), p. 11.]

A.D. 1805, May 18.—Nº 2849.

HOBSON, CHARLES, **SYLVESTER**, CHARLES, and **MOORHOUSE**, JOHN.—"Lining water spouts," &c.

This invention consists in the use of a new material for the above and other purposes. The material is zinc rolled out into sheets and if necessary annealed. The patentee points out that to roll the zinc it is necessary first to heat the ingots to a temperature of 200° to 300° Fah. The metal sheets should be joined with a solder composed of tin and zinc, or tin and lead, and the other fastenings should be of a metal most akin in galvanic nature to the zinc—such as "iron and tin."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 9 (*second series*), p. 251; Rolls Chapel Reports, 7th Report, p. 190.]

A.D. 1806, May 3.—Nº 2933.

HOOPER, STEPHEN.—"An aqueduct, tunnel, or machine for "cleansing docks and other basons of penned water," and certain other improvements.

The "moveable aqueduct, which works by suction," "consists of a pipe composed of any suitable number of pieces "joined together, one end of which, when in use, is fastened "or applied to an hole in the sluice gate or other similar part "of the apparatus belonging to the wet dock or place out of "which mud or other impurities are required to be drawn. "The other extremity of the said pipe is formed of very short "jointed pieces, or a flexible pipe composed of tarpaulin or

" other fit material, supported within by rings or other rigid " pieces of horn, wood, metal, &c. to prevent the same from " collapsing." This mouth is directed downward to the mud, and "the pressure of the superincumbent water forces the " fluid and the mud to pass out through the pipe." The end of the pipe may also be moved to fresh places when necessary.

The inventor also describes a similar flexible tube for receiving water from a sluice.

[Printed, 6*d*. Drawing.]

A.D. 1807, March 7.—Nº 3019.

BELL, Elizabeth.—1. Relates to artificial methods of sweeping chimneys.

2. Making perforated blocks of such an external form as enables them to be placed in chimneys already built. To render these flues generally useful for the conveyance of water and other fluids, they are vitrified inside. The blocks are formed by means of moulds, which are filled with clay; and then an instrument is passed through the clay in the mould to form the opening in the block of the size and shape required: sometimes the perforation is made by a boring or piercing instrument; and a wire may be used for the same purpose. The clay is ground and mixed by putting it into an iron vessel or trough fitted with knives inside; and in this vessel a vertical spindle is made to revolve, having a series of knives fixed to it, whereby the clay is cut. There is a shaft of iron passing through the lower part of the spindle, which moves round four or more iron rollers to break the clay by their gravity and motion. On leaving this vessel, the clay is made to pass through a series of double rollers, to break or keep back any stones that may be left in it. There is also a machine described for raising the prepared clay into carts.

[Printed, 6*d*. No Drawings. See Repertory of Arts, vol. 12 (*second series*), p. 89; and Rolls Chapel Reports, 7th Report, p. 198.]

A.D. 1808, April 30.—Nº 3127.

BELL, William.—Making tubes of porcelain, pottery, and various compositions which are vitrifiable. These tubes are formed in such a way at the ends as to fit one within the other, and are connected or united together by cement so as to make them water-tight. They are enclosed in cast-iron pipes or cases to prevent their being broken or burst. Tubes may be made of compound metals or of wood variously prepared, and enclosed as above for particular purposes.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 14 (*second series*), p. 31; and Rolls Chapel Reports, 7th Report, p. 201.]

A.D. 1810, January 15.—N° 3292.

MURDOCK, William.—"An improved method or process "for boring and forming pipes, cylinders, columns, and circular disks, out of solid blocks and slabs of stone of any kind "or description."

The invention consists in perforating blocks or cutting out cores by means of a tube the lower edge of which is formed as a saw. This tube works vertically through the block, being rotated by alternate pulls at the ends of the rope passing round a barrel on the vertical axis of the tube. A column of water is maintained in the tube, which forcing its way under the saw removes the sludge from the bore. When the tube is very long holes may be perforated here and there to let out the sludge, the holes being subsequently stopped. The tube is so contrived that it may slide vertically on its spindle and it is kept up to the work by weights. The cores so cut out may be bored by a smaller tube and so make smaller pipes.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 18 (*second series*), p. 321; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 303; Smith's Magazine, vol. 1, p. 37.]

A.D. 1810, March 22.—N° 3319.

DEYERLEIN, Johann George.—This invention consists in a box or receptacle into which clay is put, and then upon the clay a plunger or forcing instrument is made to act; by means of which the said clay is forced outwards through suitable openings or orifices which give the figure or form required to the expressed clay, such as that of bricks, flat tiles for flooring, edged tiles for roofing, or the products may be ornamental pipes, or cylindrical pipes, for conducting water,—suitable cores being fitted into the orifices for moulding such pipes.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 18 (*second series*), p. 259; and Rolls Chapel Reports, 7th Report, p. 208.]

A.D. 1810, July 3.—N° 3355.

HILL, Samuel.—"Joining stone pipes."

The inventor cuts a "piece of stone, of any length, bore, and "external dimensions," but which of course must be proportionate to the pipe, into "rims or collars." He fixes one of these collars with cement on to the end of the pipe, allowing it to project half its width, and into the socket thus formed he cements the end of the next pipe, thus completing the joint.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 19 (*second series*), p. 214; and Rolls Chapel Reports, 7th Report, p. 111.]

A.D. 1810, October 8.—N° 3391.

FRANCIS, Charles, and WATERS, William. — Joining pipes.

A groove is made in the thickness of the end of each pipe. The two lengths of pipe to be joined are placed together and a fillet or dowel inserted in the space formed by the two grooves now in juxtaposition. The space is then filled in with some suitable cement. A brick or other pedestal, hollowed to the shape of the pipe, is placed under the joint and a similar brick or block is placed over it. By this means the level of the pipe is adjusted and the joint protected.

There may be more than one groove in the end of the pipe, if necessary or preferable. The inventors also describe a method of joining an earthenware pipe to a wood pipe which may have been previously laid down. The wood pipe is opened out to take the end of the earthenware pipe and also to allow of a number of nails being driven in to hold the cement. Small nails are also driven into the end of the wood pipe, and are worked round with rope yarn, to form a holding for some cement to be applied externally.

The inventors also claim the right to make earthenware pipes "above five feet in length."

[Printed, 6*d*. Drawing. See Rolls Chapel Reports, 8th Report, p. 82.]

A.D. 1814, April 18.—N° 3803.

READ, John.—Preparing pliable clay or marle by working them with water to a complete puddle, which should be strained through a fine wire sieve into vats. When sufficiently dry, it must be worked by hand, or ground in a common clay mill.

To form pipes for raising and conveying water.—Sping them on a staff on a potter's wheel; form their ends with spigot and faucet joints, and others with flanch joints. When sufficiently dry, bore the inside to a true cylinder, and then burn them. Use Roman cement in forming the joints. The patentee forms the pipes of pumps in this manner, and glazes those of the lifting barrel inside. He unites the flanch joints with screws and metal collars; and secures the pipes to the side of the well. Steam, gas, or any other fluid may be conveyed in pipes prepared in manner before mentioned.

[Printed, 6*d*. Drawing. See Mechanics' Magazine, vol. 2, p. 360; also vol. 3, p. 168.]

A.D. 1817, December 5.—N° 4183.

BUSK, William, and HARVEY, Robert.—These improvements in making pipes or tubes of porcelain, clay, or other ductile substances, consist in the use of a cylinder in which the clay is put, and in then forcing the clay by means of a piston through a moulding orifice, fitted with a core, so as to form a continuous pipe.

The apparatus may be placed on a carriage.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 33 (*second series*), p. 324; and Rolls Chapel Reports, 8th Report, p. 127.]

A.D. 1821, October 18.—N° 4595.

HAWKINS, Stephen.—" Air traps for privies, waterclosets, " close stools, chamber conveniences, and other purposes to " which the same may be applicable."

This invention consists of a valve in the shape of a dish, fitted with a counterbalance. When the water or soil is deposited, it opens by the weight of such water or soil, and after allowing it to pass, closes again on account of the balance weight. The specification shows this improvement adapted to a drain.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 3, p. 287.]

A.D. 1822, October 18.—N° 4716.

WILLIAMS, John.—" A method to prevent the frequent re- " moval of the pavement and carriage paths, for laying down " and taking up pipes, and for other purposes, in streets, " roads, and public ways."

The patentee says:—" To effect this object I construct sub- " ways and passages capable when once formed of preventing " the frequent opening of the streets and roads." " I propose

“ to open the ground to the required depth, say, of ten feet,
“ lay a course of bricks, stones, or iron nearly level, or rather
“ curved on the ground, five feet wide, with drains to go into
“ the sewer, raise a wall on each side five feet high, and arch
“ it over, so as to leave the height in the centre of it seven
“ and a half feet clear ; leave openings of nine inches in each
“ upright wall at the distance of every twenty feet, three feet
“ from the base ; from these openings carry tunnels to the
“ sides of the streets, and at the end of the tunnels fix gratings
“ or doors, to be opened from the inside ; leave similar openings
“ in the top of the arch at the distance of every hundred
“ feet, for the admission of light and air, and doorways five
“ feet high and three wide in each side wall, where these
“ openings are made. These sub-ways may be entered at the
“ sides by doors and passages wherever required, from the
“ houses and buildings in the streets and roads, in the same
“ manner as into cellars that are under the streets, and the
“ main pipes for every purpose may be placed therein on iron
“ cradles or otherwise, and the service pipes for the supply of
“ the public through the tunnels or openings in the side walls.
“ These sub-ways may also be formed double, or another
“ parallel to the first one for water, and the other for gas
“ pipes.”

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 42 (*second series*), p. 204 ; London Journal (*Newton's*), vol. 5, pp. 9 and 29 ; and Engineers' and Mechanics' Encyclopædia, vol. 2, p. 646.]

A.D. 1824, May 6.—N° 4948.

VINEY, James.—“ Certain improvements in and additions to
“ waterclosets.”

This invention relates almost entirely to waterclosets, and so far does not properly appertain to this series of abridgements. In providing, however, for the passage of the sewage from the closet in the house to the sewer, the inventor makes use of a pipe passing with considerable fall, through the house wall, into a vertical pipe or shaft, communicating at the bottom with the sewer, and opening at the top into the atmosphere. The junction of the inclined pipe with the vertical pipe or shaft is trapped by a vertically hanging flap.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 10, p. 140.]

A.D. 1825, February 1.—N° 5086.

LEES, Edward, and HARRISON, George.—Machinery for making bricks, &c.

The clay is put into a cylinder or hopper in which it is worked by a number of arms or knives attached to a vertical spindle. As they revolve they moreover force the clay through openings in the sides of the hopper into rectangular chambers in each of which works a piston. These chambers are open at the bottom, and under the opening an endless band brings the moulds for the bricks, one by one. The moulds are in size corresponding with the section of the pressing chambers, and indeed when a mould is under a chamber it practically forms part of it. The piston now descends and forces the clay into the mould. The cutter advances and divides the clay in the mould from that in the chamber, and the band moving onwards carries with it the mould containing the brick. The revolution of the clay knives is continuous, but the movements of the band, mould, piston, and cutting instrument are obtained by cam action, and are of course intermittent.

The machine is claimed to be applicable to the making of draining bricks.

[Printed, 1*s*. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 188; London Journal (*Newton's*), vol. 12, p. 180.]

A.D. 1825, February 19.—N° 5094.

LEES, Edward.—"Certain improvements in waterworks, and " in the mode of conveying water for the purpose of flooding " and draining lands, which said improvements are also ap- " plicable to various other useful purposes."

[No Specification enrolled.]

A.D. 1825, August 8.—N° 5232.

BAGSHAW, Samuel. — "A new method of manufacturing " pipes for the conveyance of water, gas, and other fluids."

This is a combination of tubes of different diameters, the smaller being placed within the larger. They are made to break joint, and layers of cement are interposed between them. The tube is made in the following manner: —Clay is wrapped round a wooden roller, which when sufficiently coated is placed in the hollow of a cast-iron cylindrical mould, made in two halves. The whole is then pressed, and while under pressure the roller is withdrawn by a circular movement which smoothes the inside of the clay tube. This is then removed, dried and fired. A number of tubes thus made are strung on a pole and then surrounded by a series of larger tubes, breaking joint with the former and having cement between them. A socket may be formed by means of one tube larger than all the rest put on outside, or in other ways.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 3 (*third series*), p. 42; London Journal (*Newton's*), vol. 11, p. 185; Register of Arts and Sciences, vol. 3, p. 346; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 303.]

A.D. 1828, September 4.—Nº 5698.

FARISH, William.—Clearing watercourses.

This invention consists in a method of cleansing a "water-" course" or "drain" by the employment of "self-acting " machines, which when filled to a proper height with water, " shall on a sudden empty the said water in such a manner " and with such power as will render it capable of washing " away" the obstructions desired to be got rid of. The inventor claims "the employment and application of all and " every such self-acting machine to this purpose."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 599; London Journal (*Newton's*), vol. 9 (*second series*), p. 117; Register of Arts and Sciences, vol. 3 (*new series*), pp. 285 and 346.]

A.D. 1832, April 13.—Nº 6257.

CLARK, John James, NASH, John, and LONGBOTTOM, John.—Machinery and implements for making pan-tiles, flat tiles, drain tiles, sole tiles, flooring tiles, bricks, quarries, water pipes, and other tubes, coverings for buildings, &c., also for making loaves and biscuits.

1. Forcing the clay from a pug mill through a hopper into two sets of detached or moveable moulds, carried by two pairs of wheels fitted with pistons to eject the filled moulds. The moulds are covered or lined with fibrous elastic substances or fabrics, capable of alternately absorbing and giving out air and moisture. Water or other liquid is applied in a novel manner to the moulds, pistons, and accessory working parts. Heaters are applied to the moulds.

2. Making flat tiles, flooring tiles, or coverings for buildings, by *forcing* the clay from a pug mill through a funnel-shaped

hopper, the mouth whereof is made of a shape corresponding to the transverse section of the tile, and it is turned to one side so as to deliver the shaped clay on to an endless band.

3. Forcing the clay from a pug mill through a funnel-shaped hopper fitted with a core, so that it will be caused to emerge therefrom in the form of a pipe.

[Printed, 1*s.* 4*d.* Drawings. See London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 13; Mechanics' Magazine, vol. 23, p. 177; and Engineers' and Mechanics' Encylopædia, vol. 1, p. 259.]

A.D. 1833, May 25.—N° 6426.

BEART, Robert.—Manufacturing drain and other tiles by the use of moulds, capable of containing sufficient clay for a number of tiles, and provided with a false bottom, beneath which a piston is caused to act when required, and thus force above the upper edge of the mould a proper quantity for forming one tile. This portion is cut off level with the upper edge of the mould by means of an instrument furnished with a stretched wire; and then a further quantity of clay is forced up. The tiles thus produced, when intended for drain tiles, will only require to be bent over a proper shape or mould whilst moist. In place of the mould remaining stationary whilst the clay is forced up by the piston, the latter may remain stationary, and the mould be caused to descend.

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 1 (*new series*), p. 11; and London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 86.]

A.D. 1836, December 9.—N° 7253.

TWEEDDALE, George Marquis of.—Forming drain tiles by passing the clay from the feeding hopper between two horizontal cylinders on to an endless web, which passes over a shaping cylinder, turned out in the middle to the form of a drain tile; after which the tile is completed by passing between a pair of inclined rollers and a second shaping cylinder, and is carried by two narrow endless bands beneath cutting wire, and thence by an endless web to the drying shed.

Making flats or soles by passing the clay between the horizontal cylinders on to an endless band, by which it is carried to the cutting wires.

Flat roofing tiles of equal thickness throughout are made in like manner; but if required to be thin at the upper or nail end, or to have a flat knob or prominence on the end, the upper horizontal cylinder must be suitably shaped. A nail-hole is made in each tile by a punch attached to a lever.

Instrument for placing flat tiles on the drying shelves instead of the common peal.

Bricks are produced by modifying the machinery used in manufacturing flat tiles.

House tiles are formed by a pair of moulds, the upper worked by a lever or crank, and the lower capable of sliding on a rod out of its frame to deliver the tile.

The clay is prepared by passing between a pair of large crushing cylinders, and is then milled in the usual way.

[Printed, 1*s.* 2*d.* Drawing. See Repertory of Arts, vol. 11 (*new series*), p. 193; and Mechanics' Magazine, vol. 31, p. 242.]

A.D. 1838, August 1.—N° 7757.

TWEEDDALE, George Marquis of.—The invention forming the subject of these Letters Patent is the same as No. 7253. By the former Letters Patent the invention was protected in England, Wales, and the town of Berwick-upon-Tweed; and these Letters Patent were granted to extend the protection to the Colonies.

[Printed, 1*s.* 4*d.* Drawings. See Engineers and Architects' Journal, vol. 6, p. 202.]

A.D. 1840, February 22.—N° 8391.

KERR, Thomas.—An improved mortar or cement, which may be used, amongst other purposes, “for arches of bridges, “ culverts, drains, &c.”

The composition of the cement used for this purpose consists of one part of chalk or “similar calcareous substance,” one part of a mixture of oil and pitch in a melted state, one part of bay or common salt, and four parts of powdered road sweepings, or sand or ashes well sifted, the whole well stirred and incorporated.

This cement “may be either employed in the way of ordinary mortar, observing only the precaution to cover the “ centerings with strong paper, to prevent any adhesion of the “ surfaces, or where the structure is of small span the cement “ (mixed with small stones) may be cast in moulds into blocks, “ to be used in place of bricks or stones, filling up the joints

" between these blocks with the same cement in a hot or fluid " state."

Modifications of this material may also be used "for gas and " water pipes and other articles intended to be fixed under " ground."

[Printed, 6*d*. No Drawings. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 415; Mechanics' Magazine, vol. 33, p. 253; Inventors' Advocate, vol. 3, p. 131.]

A.D. 1841, May 22.—N° 8965.

AINSLIE, John.—Machinery for making or moulding tiles, bricks, retorts, tubes, and other articles. The clay descends between a pair of feeding rollers (each furnished with a doctor or scraper beneath for guiding the clay) into a case containing a screw, by the revolution whereof the clay is forced into a chamber, and thence through moulds suitably formed to produce the articles required; and, on emerging therefrom, the moulded clay is received by a travelling endless web, which carries it beneath a cutting apparatus for dividing it into proper lengths. For making drain tiles, the roof of the chamber is formed on its internal side with diverging arches, each arch diverging to its corresponding mould, so that the clay, in its progress to the mould, receives an embryo shape, and is enabled to discharge itself in straight lines. Moulds for retorts must have cores suspended therein. When making house tiles, each mould must be formed with a sluice or stopper, by raising which a knob or button is left on the tile.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 4 (*enlarged series*), p. 75; Mechanics' Magazine, vol. 35, p. 286; Inventors' Advocate, vol. 5, p. 197; and Engineers and Architects' Journal, vol. 5, p. 427.]

A.D. 1841, December 7.—N° 9165.

IRVING, William.—Forming bricks and tiles by filling a large mould with clay, cutting off the surplus even with the top by a scraper, and then drawing a series of wires or narrow knives through the clay, which is thereby divided into a number of bricks or flat tiles, according to the dimensions of the mould and the distance between the wires or knives. Flat tiles, so made, may be bent into the proper form for draining purposes.

[Printed, 1*s*. 6*d*. Drawings. See Engineers' and Architects' Journal, vol. 5, pp. 8 and 61.]

A.D. 1842, May 31.—N° 9371.

WATSON, Richard, junior.—1. Making perforated tubes and tiles for draining purposes, with the holes or openings enlarging from the outside inwards, whereby the openings will be rendered less liable to become clogged, and the water will be voided into the tube more freely than when the holes are of the same size throughout, or larger externally than internally.

2. Draining embankments and cuttings of railways and other engineering works, by applying perforated tubes from the face of an embankment, or of an open or other cutting.

3. Apparatus for boring holes in brickwork or masonry for draining cuttings and embankments of railways and other engineering works which are faced or lined with brickwork or masonry.

[Printed, 1*s*. 10*d*. Drawings. See Mechanics' Magazine, vol. 41, p. 336; Record of Patent Inventions, vol. 1, p. 331; and Engineers' and Architects' Journal, vol. 7, pp. 49 and 66.]

A.D. 1842, October 8.—N° 9487.

DEUTSCHE, Claude Edward. — "Improvements in combining materials to be used for cementing purposes, and for " preventing the passage of fluids, and also for forming or " constructing articles from such compositions of materials." " The foundation of the invention is, the use of combustible, " bituminous substances, such as bitumen, asphalte, pisasphate, mattes, mineral caoutchouc, and the produce of the " distillation of coal." The specification consists of a number of recipes for making the bituminous composition, giving the proportions of the ingredients to be used. The substance may be used for "forming subterraneous passages for water," and " it may be formed into roofs, gutters, and tubes of every " description for the passage of gas and other fluids."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 3 (*enlarged series*), p. 299.]

A.D. 1842, December 3.—N° 9538.

ETHEREDGE, Frederick William.—1. Improvements in pug mills or such like machines, suitable for forcing clay or brick earth through orifices, in order to make two or more tiles simultaneously at one orifice, by causing the clay to pass over a mandril or core fitted with knives, which nearly cut through or divide the tubular-moulded mass of clay into two or more parts, so that such parts can be readily separated when dry.

2. Forming the bottom of a pug mill or other suitable expressing machine with several moulding orifices, each capable of making one or more tiles, combined with suitable apparatus for cutting off the tiles as they are forced through the orifices.

3. Mode of applying apparatus for receiving tiles as they are forced down through orifices in the bottom of a pug mill or other suitable expressing machine, and thus facilitating the removal of the tiles as they are formed and cut off.

The title of these Letters Patent originally read thus: "Improvements in the manufacture of bricks, tiles, and other similar plastic substances;" but by a Disclaimer and Memorandum of Alteration, filed in the Great Seal Patent Office, 5th June, 1843, the title was altered to "Improvements in the manufacture of tiles."

[Printed, 2*s*. Drawings. See Repertory of Arts, vol. 2 (*enlarged series*), p. 65; Artizan, vol. 4, p. 158.]

A.D. 1844, January 20.—N° 10,020.

BASFORD, William. — Manufacturing "bricks, tiles, and quaries, and certain other articles made or composed of brick earth."

The first part of this Specification, which is very comprehensive in its character, has reference to the moulds to be used in making bricks, tiles, and building blocks, &c. One of these moulds for "making bricks to be used in building arches, circular pillars, chimney tops, tunnels, flues and culverts or sewers," differs from that ordinarily used for such kind of bricks in that it has "the rounded or circular sides open, instead of having the flat beds open." The clay is introduced at the larger and rounder side, so that the rounded parts may be smoothed or polished. Various tools for smoothing the work are described as well as methods of facing with finer clay and polishing the surfaces.

The invention has also reference to methods of moulding, paving, roofing and draining tiles, but they do not refer to any specific way of making the last. "Under drip tiles for roofs," are also described. They are laid immediately under the joints of the surface tiles and have a "hollowed or grooved centre within which the rounded or angular extremities of the "surface tiles lie with their joints or edges close together," and these drip tiles carry off the water which may penetrate through the joints.

The patentee also manufactures large blocks for gutter spoutings of clay. They are smoothed, jointed with cement, and afterwards painted. They may be made with rabetted joints.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1844, March 30.—N° 10,132.

CLAYTON, Henry.—Drain pipes and tiles.

The clay is placed in cylinder supported in the machine, and if it be desired to cleanse the clay from stones, &c. it is forced by a piston from this cylinder through a grated or perforated plate which may afterwards be removed. A plate containing a suitable die, of which the inventor shows many forms, is then substituted for the perforated plate and the clay forced through in the form of a pipe. A pair of rods carrying a cutting wire severs the lengths of the pipe as determined by a gauge. Instead of this form of cutting apparatus the stream of clay pipe may be received on an endless band placed in an inclined position under the die, whence the workman takes off lengths on a mandril or gauge rod furnished with a cutter. The piston rod is hollow and the piston composed of a disc of metal covered with felt packing, over which is placed a packing ring. This forms a species of cup,to receive the water which slowly flows from the piston rod and the packing being thus saturated the cylinder is properly lubricated. The piston is forced down by two vertical racks secured to the crosshead of the piston rod and worked by a pair of pinions. Two cylinders may be used to save time ; they are placed on swinging brackets or jibs.

The inventor also claims a "gauge board and cutter" for reducing pipes, &c. to a uniform length before they are fired, the contraction being properly allowed for according to the mass of the tile. He makes short tiles or junction pieces by partially dividing a length and breaking it up when fired. He also makes several pipes at a time, through a die furnished with several cores, the pipes being afterwards separated. Bent tiles are made by slitting longitudinally a pipe of suitable size as it issues from the dies.

[Printed, 8*d.* Drawing. See Mechanics' Magazine, vol. 41, p. 395 ; Engineers' and Architects' Journal, vol. 14, p. 446.]

A.D. 1844, April 18.—N° 10,147.

DENTON, John Bailey.—Relates to machinery for moulding or shaping clay and other plastic substances into drain tiles, pipes, bricks, &c.; and consists in a mode of combining the use of two screws, which simultaneously act to press the clay or other plastic matter, either directly through suitable moulding orifices or into a chamber or chambers, from which it is forced through suitable orifices by other apparatus.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 5 (*enlarged series*), p. 95; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 393; and Engineers' and Architects' Journal, vol. 8. p. 89.]

A.D. 1844, May 23.—N° 10,200.

WILSON, Richard.—"Improvements in the manufacture of "tiles."

These improvements relate to the manufacture of curved tiles for roofing or draining. "After the clay is properly "tempered and pugged as stiff as possible, it is cut into flat "sheets a little thicker than the tile is wanted, either by a "mould crossed with strong wires being fixed under the pug "mill or otherwise." "Each sheet is then taken by a boy and "laid quickly into a thin plate made of sheet copper or other "suitable material the shape of the under mould, the sheets "of clay being previously sanded or dusted." The moulds are placed on the periphery of a hexagonal wheel. "The plate "with the sheet of clay on it is instantly taken by another boy "and placed into the under mould." "The thin plates have "ribs or hooks on the ends, which fit into notches made in "each end of the under mould, to hold the plate in its proper "place, also a small hook on the back which catches the "underside of a small plate screwed across a hole made in the "inside of the under mould, to prevent the plate and tile "rising with the upper mould" or die "after the pressure. At "the moment of delivery the hook on the back frees itself by "the plate slipping down about half an inch before dropping "off. One of the end hooks prevents the plate" "from "slipping out of the under mould when lying in a slant direc"tion as first laid on; the other prevents them slipping out "too soon in an opposite direction after having been pressed." "When the hexagonal wheel is turned to the proper place for "delivery, both the tile and plate drop out of the under "mould either upon a flat belt or tile horse." To facilitate delivery both the plate and die may be covered with fustian or a similar material.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 233.]

A.D. 1844, July 30.—N° 10,276.

FORD, William. — "Improvements in the manufacture of "tubes for draining land, and for other purposes, and in drain, "tiles."

The machine described and illustrated in this Specification consists of a box into which the clay is placed and from which it is subsequently forced through dies by means of a piston. The dies are on one side of the box, the piston working from the other and the clay being put in at the top. The piston is worked by means of a screw on its rod passing through a female screw in a bevil wheel, and by means of two projections on it, the machine is stopped at the end of the stroke of the piston in coming out or going in.

In order to make a socket at the end of a pipe it is placed in a wooden mould resting at one end against an abutment in the mould and projecting somewhat beyond the mould at the other. A stick or mandril having a shoulder on it is then forced into the tube, and the shoulder drives the projecting length of tube into an annular or moulding space turned out of the mould and forms the socket.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 5 (*enlarged series*), p. 368; Mechanics' Magazine, vol. 42, p. 439; Engineers' and Architects' Journal, vol. 8, p. 119.]

A.D. 1844, August 29.—N° 10.299.

SMITH, James, and JOLLY, William Gairdner. — Making drain tiles.

This invention consists firstly in making tiles, whether tubular or bent, with jagged or indented ends, so that they may interlock and give mutual support. These tiles are made in a machine of the following description. A horizontal frame slides in guides secured to standards, and upon this frame is placed the horse to receive each tile as it is formed. When the frame thus carrying the horse is pushed forward and then drawn back by the workman it communicates motion by means of ratchet gear and pinions to a pair of rollers and a feeding belt. The latter brings up the clay to the former which roll it into a suitable sheet and deliver it in proper quantity upon the horse. The workman next manipulates a lever furnished at the end with a needle for cutting the clay. As he works this lever he draws it across a waved bar which causes the needle to cut the clay in a similarly waved manner. The sheet of clay now lies on the horse severed from the mass and waved at its ends. The workman then fits it to the horse and joins the edges if it be required to take the form of a tube and removes it to dry. In order to assist the workman the inventors sometimes use a "circular mould consisting of " three segments, two of which open upon hinges. The sheet " of clay is received upon the open hollow of the mould in " a similar manner as that described for receiving it upon a " horse" and similarly cut. The core is then put in, forced down, and the segments folded over and compressed, either by hand or by levers worked by a treadle. Tubes may be made of peat in this way, the peat being either delivered into the mould by rollers, or thrown in by hand. But whichever substance is used the horse or core is to be slightly oval, " so that by a slight movement upon its centre it will free " itself in the substance, and be more easily withdrawn from " the tube when it is being placed to dry."

Other machinery is also described whereby the clay is forced through dies, one within the other, making a large tube with a smaller inside for convenience of drying and economy of space. The clay is placed in a hopper over the chamber.

The advance of the piston cuts off a portion, and a sliding door attached to the rear of the piston closes the bottom of the hopper till the return stroke. The tube is cut by a wire in a manner analogous to that above described, and is delivered on to a tray which is hinged at one side and is made to deposit each tile side by side with its predecessor on a proper shelf. The machine automatically travels the breadth of a tube at each stroke to facilitate this depositing, and it may be raised or lowered for the purpose of delivering the tubes in successive layers. A progressive movement is also given mechanically to the machine first described.

The patentees furthur claim the manufacture of drain tiles by moulding or shaping peat into the desired forms.

[Printed, 2*s.* 10*d.* Drawings. See Repertory of Arts, vol. 6 (*enlarged series*), p. 1; Engineers' and Architects Journal, vol. 8, p. 263.]

A.D. 1844, September 26.—Nº 10,327.

CASSELL, Edwin Edward.—"A material or combination of "materials suitable for" "water pipes, drains, sewers" &c. The inventor prepares four compositions, viz., No. 1 of powdered chalk, lime, loamy clay or sandy earth mixed with oil of tar or mineral tar or vegetable naptha "or any other "resinous, oily or fatty matter." One hundredweight of melted rosin is mixed with two hundredweight of the saturated chalk or earth. To this are added "from three to six pounds "of liquid caoutchouc, or from 1 to 3 lbs of essential oil of "tar or turpentine or some other oily or fatty or cementitious "substance (varying the quantity according to the degree of "elasticity desired)," "and after that from three to five "pounds of sulphur and finally two hundredweight of fine "dry grit," the whole being thoroughly amalgamated. In No. 2 for rosin is substituted vegetable pitch, and more sulphur is used. In No. 3 instead of the rosin or pitch, "equal parts of rosin and Stockton tar" are used and less sulphur. No. 4 differs from No. 3 "in the substitution of "equal parts of rosin and mineral or coal tar for the equal "parts of rosin and vegetable pitch."

For forming piping, any of these compounds is used, and combined with wood. Two cylinders are placed "on end, "one within the other, the inner being of the size of the "desired pipe, and the spaces between it and the outer being "of the diameter intended to be given to the case of the pipe." "In the middle of the space between the two cylin"ders" is formed "a ring of small oblong or square pieces "of wood" built together like bricks and cemented by the compound in a hot and fluid state. Then the vacant spaces are filled up with the compound and when cool the cylinders are withdrawn. When very large pipes are to be made, the rings are made larger and strengthened by "vertical tie rods "terminating at both ends in nuts and screws." Where the piping is not less than 18 in. in diameter, a skeleton framework of iron or wooden hoops connected vertically by wooden laths is used. Still smaller pipes may be made of the compound alone.

[Printed, 1*s*. Drawing. See Mechanics' Magazine, vol. 42, p. 329; Engineers' and Architects' Journal, vol. 8, p. 223.]

A.D. 1845, January 18.—N° 10,481.

AINSLIE, John. — Improvements on the machinery which formed the subject of Letters Patent N° 8965. The clay, in this instance, is conducted by a travelling endless web to a pair of rollers (each provided with a hinged scraper), which carry it into a chamber, and force it through a mould or moulding orifice in front of the same on to an endless web, whereby it is carried to the cutting apparatus. A screen (with a descending sluice or cleaner) may be placed in the middle of the chamber to separate stones or roots from the clay. When sandy clay or peat is to be moulded into tiles or brick, rollers with "reefing slides" (moved in and out by a cam) must be substituted for the plain rollers.

Also, employing a piston for cutting off bricks (as they emerge from moulding orifices) by means of the pressure of compressed air.

[Printed, 1*s*. 6*d*. Drawings. See Repertory of Arts, vol. 6 (*enlarged series*), p. 231.]

A.D. 1845, January 21.—N° 10,483.

SELLER, John.—Machinery for drain cutting.

When a drain is to be cut a hole is first dug in the ground corresponding with the depth of the drain required. Into this hole is lowered the cutting apparatus which is supported on a carriage and made to travel with it. This cutting apparatus consists of a vertical bar furnished with cutters the whole of which rotate as the machine advances, cutting away the soil and allowing it to fall to the bottom of the hole, whence it is removed by a kind of endless chain of buckets which travels behind the cutters. The bottom of the trench is shaped and levelled by means of two plates having a share in front.

[Printed, 10*d*. Drawing.]

A.D. 1845, March 27.—N° 10,577.

WELLER, Richard.—Machinery for making drain and other tiles and pipes, consisting of two vessels for receiving the clay, mounted on trunnions at opposite ends of the framing, and successively acted upon by two pistons (fixed at opposite ends of a horizontal rack bar), for the purpose of expressing the clay through dies or moulding orifices at the outer ends of such vessels. Motion is communicated to the rack bar by means of a lever, and one piston is thereby caused to advance and express the clay from one cylinder, whilst the other cylinder, which has been caused to assume a vertical position, is being filled with clay, and so on alternately. In each piston there is an opening covered by a valve, which permits air to pass between the piston and the clay when the piston is drawn back. The tiles, as they are forced out, are received on suitable horses, and cut off by means of wires carried by a sliding frame; and when holes are to be punched in the tiles, a suitable punch is affixed to the sliding frame.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 7 (*enlarged series*), p. 33; and Engineers' and Architects' Journal, vol. 8, p. 385, and vol. 9, p. 63.]

A.D. 1845, April 22.—Nº 10,634.

ROE, FREEMAN.—Pipes for conveying fluids.

These pipes are made of glass in the following manner. The crucible or pot in which the glass is melted is provided with orifices at front and back in which is placed a tubular mandril coated with clay. This mandril completely fills the hole at the back, but a space is left around it at the front orifice corresponding with the thickness of the intended pipe, the mandril bearing a similar relation to its diameter. In front of the orifice is placed a mould, made up of two semi-circular halves, hinged together. A long tube having a bell mouth equal in size to the diameter of the mandril is inserted into the orifice and collects some of the melted glass upon it. As it is withdrawn it brings with it the glass, drawing it in the form of a rough tube over the mandril. A current of air passing up the mandril and tube during the process keeps the tube in shape. It is then placed in the lower half of the mould and quickly closed in. At the same time a valve at the end of the tube is closed, and the sudden pressure of the arrested current forces out the soft glass tube to take the shape of the mould. It is then severed from the tube and mandril and annealed. Curved pipes are also similarly made.

These pipes are joined by means of metal unions and cement, or they have metal collars attached to them and are then screwed together, or they may have threads formed on them by moulding. Offsets are made by joining the ends of the pipes in a suitable union.

In consequence of the removal of the duty on glass these pipes are claimed to be cheaper than those of iron.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 7 (*enlarged series*), p. 46; Mechanics' Magazine, vol. 43, p. 321; Engineers' and Architects' Journal, vol. 8, p. 386.]

A.D. 1845, April 24.—N° 10,636.

BEART, Robert.—1. Brick for building purposes, made by forcing brick earth through a moulding orifice, having a series of cores to form holes in the brick.

2. Making holes or recesses in the ends of drain tiles or pipes, for the reception of wood or metal pegs, whereby the tiles or pipes may be connected together and retained at the same level.

3. Machine for moulding drain tiles, consisting of a horizontal trunk or chamber, into which the clay is introduced, and is then forced by a piston through moulding orifices in the end of the trunk. A grating is fixed across the trunk, near the moulding orifices, to intercept any stones which may be in the clay; and the piston is made hollow to receive such stones. The surface of the grating is kept free from stones by means of a knife or scraper, worked by a lever, and, by raising a plug, air is admitted into the space caused by the knife or scraper between the clay and the grating, so as to facilitate the return of the piston.

[Printed, 1*s*. 4*d*. Drawings. See Repertory of Arts, vol. 7 (*enlarged series*), p. 14; and Mechanics' Magazine, vol. 59, p. 46.]

A.D. 1845, October 2.—N° 10,845.

HALL, Alfred.—Apparatus for making bricks, tiles, and other articles from earthy or plastic materials, by conducting the clay or other plastic material from a pug-mill into a chamber provided with a pressing plate, which turns on an axis at one edge and presses the clay through a grating (forming the bottom of the chamber) into a mould. The grating consists of a rectangular frame, with cross bars or divisions corresponding in number with the bricks or tiles to be produced at one working, or rather with the number of compartments in the moulds which are successively placed beneath it.

[Printed, 1*s*. Drawings. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 153; and Engineers' and Architects' Journal, vol. 9, p. 355.]

A.D. 1846, January 15.—N° 11,041.

BENSON, William.—Producing drain, ridge, and other tiles, pipes, and other articles, by a machine resembling the ordinary pug-mill, the vertical shaft whereof carries curved knives or arms, and is enlarged at the bottom into a conical form; at the lower part of the mill there are four dies or moulding orifices, situated at the four opposite sides of the same; and through these orifices the clay is forced by the curved knives (with the assistance of the cone) on to endless webs of flannel or other suitable flexible material, and cut into proper lengths by the aid of a "horse."

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 193; and Engineers' and Architects' Journal, vol. 9, p. 356.]

A.D. 1846, March 25.—N° 11,149.

SMITH, Charles.—Stench traps.

This Specification describes very many improvements in "cooking and culinary utensils," &c., in addition to an improvement in stench traps. This trap consists of a cast-iron vessel or basin containing water, and having a channel or groove round it, also filled with water, for the reception of the flanged edges of a dished and perforated lid. The waste water or sewage, when poured into the lid, runs through the holes into a funnel-shaped pipe, the end of which dips into the water in the vessel. It then passes from the trap into the drain through a series of orifices placed above the bottom of the vessel or basin.

[Printed, 3*s*. 6*d*. Drawings. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 356.]

A.D. 1846, June 2.—N° 11,236.

PERCY, William Carter Stafford.—1. Tempering or preparing clay or other plastic material by mixing with water to a thick creamy consistency, agitating in a pug mill or otherwise, passing through a sieve to separate stones or other hard substances, permitting the mass to stand until the clay subsides, and then drawing off the water, and drying the clay until ready for use. The drying may be accelerated by using the waste heat from brick clumps or kilns; and this waste heat may also be employed for drying bricks previous to burning.

2. Bricks with grooves or cavities in the sides to be used for the prevention of damp walls, for heating and ventilating, &c., &c.

3. New form of brick for building bridges, viaducts, tunnels, chimneys, towers, &c.

4. New form of brick to be used for coping or covering walls and parapets, the gable ends of buildings, &c.

5. Grooved brick for retaining all kinds of plain or ornamental plaster or cement.

6. Hollow rectangular drain tile, formed with a grating at the top, for the purpose of permitting the water to drain through in wet weather, and to evaporate and moisten the soil in warm weather. The patentee claims the above forms of bricks and tiles, whether made of clay or other plastic material or composition, or of wood, stone, or any other material.

7. Machine for pressing bricks or tiles in a deep mould between two pistons, the upper affixed to a sliding frame, and the lower piston acted on by springs.

8. Peculiar construction of chimney top to prevent down draught.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 264.]

A.D. 1846, July 6.—N° 11,282.

RANSOME, Frederick, and WARREN, John Crabb Blair. —1. Preparing clay or plastic materials for forming bricks, tiles, pipes, and similar articles, by the admixture therewith of vegetable, mineral, or bituminous substances (as sawdust, spent tanners' bark, shavings, wood chips, charcoal, chopped straw, small coal, asphalte, pitch, &c.), which, being destructible, or partially destructible, by fire, may be burnt out of the bricks, tiles, pipes, or other articles, when they are submitted to the ordinary process of burning, leaving such articles exceedingly porous, and particularly applicable to subsoil draining.

2. Relates to brick and tile machines having two horizontal fixed cylinders, furnished with dies or moulding orifices at the outer end, and with doors at the upper part for the admission of clay, which is forced through the dies of each cylinder alternately by the action of two pistons affixed to opposite ends of one plate or bar. The improvement consists in the

application to these machines of such gearing as will, by the continuous rotation of a pinion in one direction, cause the pistons to move alternately in opposite directions. A mode of filling the cylinders is also described.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 171; and Engineers' and Architects' Journal, vol. 10, p. 145.]

A.D. 1846, September 17.—N° 11,374.

FRANKLIN, Henry.—Manufacturing bricks, tiles, pipes, &c., by means of apparatus so arranged that the processes of pugging, screening, and moulding the clay may be performed in one machine. The clay is introduced into an upright cylinder, containing a double-threaded screw, which forces it downwards through screens, and then a continuation of the screw presses the screened clay into a rectangular chamber below, and thence through mould or die plates. The moulded clay is received by endless webs, which carry it beneath suitable cutting apparatus.

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 249; Mechanics' Magazine, vol. 46, p. 459; and Patent Journal, vol. 2, p. 732.]

A.D. 1846, October 22.—N° 11,426.

HALE, James Lysander.—" Certain improvements in sewer-" age and drainage, and apparatus connected therewith, parts " of which are applicable to steam engines."

The Specification embodies the following parts :—

1. The construction of a common sewer trap, in which brown stoneware and india-rubber are substituted for the iron work.

2. A valve or flap consisting of a sheet of vulcanized india-rubber backed by a plate of metal or stoneware. Or the rubber may be backed by ribs of metal, the use of which is as follows :—" Suppose the valve is covered with eight ribs, each " rib being two inches wide; now, if water two inches deep is " flowing out of the pipe, it raises the first or lower rib in the " valve, and no more, while the other seven ribs pressing " the portion of the valve beneath them on its bed renders " the valve air-tight during the egress of the water."

3. A modification of the last-named valve, consisting of a disc of metal divided by a straight cut, and joined again by an india-rubber strip.

4. A further modification consisting of a diaphragm of india-rubber, in the centre of a curved plate, attached to the end of the pipe to be trapped.

5. A ventilator for sewers, &c. The upper end of a metal shaft is perforated with holes and surrounded with a second cylinder. The upper ends of the shaft and cylinder are on a level, and the space between them affords a way for currents of air. A plate closes the top of the shaft, and prevents down draughts.

6. Relates to the application of brown stoneware instead of iron or common stone in the manufacture of sewer and other gratings.

[Printed, 8*d*. Drawing. See also London Journal (*Newton's*), vol. 30 (*(conjoined series*), p. 276; Patent Journal, vol. 2, p. 840; Engineers' and Architects' Journal, vol. 10, p. 181.]

A.D. 1846, November 19.—N° 11,456.

ASHE, William. — "Improvements in cleansing privies, " sewers, and drains."

This invention consists in the use of a bucket or vessel suspended on pivots, and so arranged under a stream of water that, when it is full, it reverses itself, and empties itself suddenly into the sewer or other drain or closet. It then returns to its normal position, and when refilled repeats the operation.

[Printed, 10*d*. Drawing. See Patent Journal, vol. 3, p. 2.]

A.D. 1847, May 10.—N° 11,700.

MARTIN, John.—" Improvements in apparatus and means " used when draining cities, towns, and other inhabited places, " and land."

The invention relates :—

1. To a pipe coupling or joint. The pipes are laid end to end, and a band made up of two hemispheres put round the joint. The ends of the bands are turned outwards, and form a dovetail on each side. A clip is slid on to each, and the joint completed.

2. To a valve which consists of a plate of slate or glass suspended at its upper edge on two pivots or projections on the face of the pipe to be trapped. It remains shut by its own weight.

3. To a trap for gullies and house drains. "It consists of a "square or oblong box, one side of which should be divided "into three equal parts, the lower division serving as the "receptacle for the silt, and the middle division being an "opening with a slate or glass valve" as above described. "The upper portion of the adjoining side should have a long "narrow opening or grating, through which the water or silt "would run, the heavy silt depositing in the box whilst "the water would press the valve open and run down into the "sewer."

The remainder of the invention relates to drains for agricultural purposes.

[Printed, 10*d*. Drawings. See also Repertory of Arts, vol. 11 (*enlarged series*), p. 11; Patent Journal, vol. 3, p. 596.]

A.D. 1847, July 29.—N° 11,818.

PAUL, JOSEPH.—Machinery for cutting drains.

The cutter consists of a wheel provided with a number of cutting teeth or arms, and carried upon a wooden frame fitted with wheels for transport purposes. The cutter is capable of being lowered to its work as it progresses and raised when not in use. In front of the cutting apparatus is a separate frame carrying the horse gear from which the cutter is worked by an endless chain. This frame is also anchored by another chain and as the machine is worked the cutter and horse gear are gradually progressed. Eaves boards are provided to throw the earth clear of the drain. After the drain has been cut and the pipes laid therein, it is filled in by means of a plough, the cutters of which scrape out a portion of the subsoil from the sides of the drain at any desired distance above the pipes, which subsoil will be bedded upon and cover the pipes. Immediately behind the cutters follow the coulters which cut away the upper angles of the drain and throw the earth down into it, so nearly or quite filling the drain according to the width and depth at which the coulters have been set. The earth which has been raised to form the drain is then levelled over by the ordinary operations of farm labour.

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*) p. 365; Mechanics' Magazine, vol. 49, p. 323.]

A.D. 1847, October 21.—Nº 11,912.

RIDGWAY, John.—Clay pipes.

This invention relates to the manufacture of "'paste' or "'patch' boxes, pomatum and other pots, jars, short pipes or "tubes." A core is placed on a "jigger" or throwing wheel and the clay applied round it, after which a template is applied to give the requisite external form. A fly press and suitable moulds may also be used.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 324.]

A.D. 1847, November 13.—Nº 11,961.

TAYLOR, George.—"Improvements in machinery or appa-"ratus for sweeping and cleansing chimneys, tunnels, flues, "drains, and other places."

The principle of this invention consists in the application to a rod or handle of a head, round which are arranged a number of brushes. The stems of these brushes fit into the head with ball and socket or similar joints, which are acted upon by springs, by which the brushes are kept in position. In front of the head is a roller, likewise attached by a similar moveable joint. Modifications of the joints and springs are mentioned.

[Printed, 1*s*. Drawings. See Patent Journal, vol. 5, p. 85.]

A.D. 1847, November 18.—Nº 11,972.

MARTIN, Thomas.—Machine for manufacturing drain tiles, tubes, and other articles, from clay or other plastic material, having two boxes or chambers fixed side by side, and alternately supplied with clay; from which boxes the clay is alternately expelled through suitable dies at the front of the same, by means of two plungers working horizontally; and the moulded clay, on leaving the dies, is received by a series of rollers, and cut into suitable lengths by a cutting apparatus. The improvement in this machine consists in a mode of combining mechanical parts for giving motion to the plungers. This invention also consists in a method of constructing dies for making pipes with sockets, so that when a sufficient length of pipe has been made the moulding orifice can be enlarged, and a socket or enlarged portion of pipe made of any desired length.

[Printed, 1*s.* 8*d.* Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 35; and Patent Journal, vol. 5, p. 85.]

A.D. 1848, March 8.—N° 12,079.

WHISHAW, FRANCIS. — The object of this invention is to provide "pipes, channels, or ducts, of any convenient form "and suitable for the passage of the wires of electric tele-"graphs" and "other purposes, wherein a number of separate "pipes or channels may be required, or wherein pipes of "earthenware or pottery of great uniformity of structure, "and certain combinations of pipes of those materials and "of glass may be employed."

The apparatus for making these compound pipes consists of a cylinder or box, suitably mounted on standards containing the clay, with a plate acting as a piston to press the clay through a suitable die or 'dod.'—The accurate joining of the lengths of pipe thus made is secured by forming a register line or mark outside the pipe. "In order to form curved pipes or "junctions intended to unite two pipes extending in different "directions, plaster moulds" are employed "such as are "commonly used for making curved pipes." The pipes are made in the ordinary way, "except that curved rods have to "be fixed in guage plates" "for the purpose of forming the "cavities or internal pipes corresponding with those made in "the straight pipes." "These curved pipes when formed are "united to the straight pipes while the material is soft." They may also be formed "by cutting up a straight pipe in "such a manner as, when placed in a curved mould and bent "to its shape, they might be joined together and form a "curved pipe." By this means of manufacture various combinations may be effected, for instance a supply and waste pipe may be combined in one. A conical "dod" or die is also described whereby greater uniformity of surface and consistency of material are obtained.

Pipes may be joined by constructing a groove round the end of one and the socket of another, which groove is afterwards filled with asphaltic or other cement; or a collar also furnished with grooves may be placed round the grooved ends and similarly filled in.

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 312; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 181; Artizan, vol. 7, p. 15; Patent Journal, vol. 6, p. 15.]

A.D. 1848, March 16.—Nº 12,098.

HOSMER, John.—"Apparatus for supplying water, and for "cleansing drains and sewers."

A cistern is constructed in two parts. As the water rises in one part it operates upon a ball float, which opens a valve in the other part. Thus the water in the latter runs out to flush the drain or sewer, while the water in the other is retained for use. Or the cistern may be undivided and provided with two floats, one of which does not come into action till the water has raised the other. The latter in rising drags the former "into a position to be able to rise by its buoyancy, by which "the valve will be raised suddenly," and a part of the water discharged to flush the drains and sewers.

Another modification is shown, but the principle is the same.

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 278; Practical Mechanics' Journal, vol. 2, p. 236; Artizan, vol. 7, p. 15; Patent Journal, vol. 6, p. 3.]

A.D. 1848, April 10.—Nº 12,115.

SPENCER, Thomas.—1. Apparatus for employing the direct action of steam pressure upon clay or other plastic materials for manufacturing pipes or tubes or other hollow earthenware, and vessels or tubes of other plastic materials. An upright steam cylinder (furnished with a suitable slide valve) is fixed on a frame above the cylinder which receives the clay, and its piston-rod extends downwards through a stuffing-box, and carries another piston, by the descent whereof the clay is forced through a dod or die at the bottom of the clay cylinder.

2. Forming the above-named articles with socket or flange ends by means of dies of peculiar construction; also, method of forming any description of goods, in the manufacture of which the inside of the lower die is withdrawn or the dies are separated.

3. Apparatus for turning over the pipe or vessels, when of large dimensions, after the first part of the process of manu-

facture ; also, the use of a drum or mandril for giving internal support to pipes (whether with or without sockets) whilst being expressed from the cylinder in combination with a sliding ring, when the pipe is made with a socket.

4. Method of forming or turning curves or bends in such pipes if with sockets, either with or without drums or mandrils, direct from the material cylinder, but if without sockets, then only when effected by means of curved drums or mandrils.

5. Method of making "stilts and feet," and burning the pipes thereon.

6. Kiln for burning pipes and other hollow earthenware.

"A further improvement consists in the grinding of earthen-" ware pipes, also turning and boring them ;" but no explanation is given of this improvement, nor is any claim made thereto.

To this Specification there is a Disclaimer and Memorandum of Alteration, filed in the Great Seal Patent Office, 26th March 1851, by which this abridgment is not however affected, except that so much relating to the turning and boring is omitted in the altered Specification.

[Printed, 1*s.* Drawing. See Repertory of Arts, vol. 12 (*enlarged series*), p. 378 ; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 145 ; Artizan, vol. 7, p. 57 ; and Patent Journal, vol. 6, p. 31.]

A.D. 1848, April 27.—Nº 12,140.

SALTER, Roger George.—"Certain improvements in carts " for the distribution of lipuid substances, and in the con-" struction of sewers, drains, and cesspools, and in the " cleansing of the same."

"Firstly, my invention, in so far as it relates to carts for the " distribution of liquid substances, consists in attaching to " such carts certain machinery or apparatus whereby the " outflow of the substances is made dependent on the pro-" gression of the cart, and the width of space over which they " are distributed may be varied at pleasure within certain " limits, say, from one yard or less to fourteen yards and " upwards. . . .

"Secondly, my invention, in so far as it respects the con-" struction of sewers, drains, and cesspools, and the cleansing " of the same, consists in attaching thereto a self-acting " flushing apparatus, whereby water or any other liquid

" substance passing along or through such sewers, drains, " cesspools, and other similar conduits and receptacles is put " up or retained therein at certain points or places until it " attains to such a height as to flow over into and fill one or " more basins or vessels suspended in chambers or recesses " made or constructed outside, inside, or at the top, or other " suitable part of the said sewers, drains, cesspools, or other " conduits or receptacles, on the filling up of which basins or " vessels they drop down, and thereby open a valve or flap, " by which the pent up water or other liquid substance is " released and rushes out with a velocity equal to the height " and quantity of the fluid."

[Printed, 1*s*. 6*d*. Drawings. See Mechanics' Magazine, vol. 49, pp. 503 and 540, also vol. 51, p. 401; Artizan, vol. 7, p. 82; Patent Journal, vol. 6, p. 65.]

A.D. 1849, January 11.—N° 12,405.

ROWE, William.—Joining pipes.

The invention consists in joining pipes, firstly, by drawing together the ends of the pipes by means of metal clips bolted together, "such metal clips being suitably shaped so as to " fit into grooves cut or formed round the external surface at " the two ends of the pipes" to be united, and a piece of soft " or elastic material being placed so as to prevent injury to " the said pipes" from the pressure of the tightly bolted clips; secondly, in joining pipes by similar clips, making use of projections or flanges instead of grooves, and the elastic packing may be dispensed with; thirdly, in the method of adapting the clips to the internal surface of the pipes; fourthly, in forming the ends of the pipes with ears and flanges, and bolting them together with interposition of soft material; and lastly "in forming in moulds glass junctions " for pipes, and afterwards cutting grooves on their outer " surface to receive the clips which may be employed to unite " or combine the pipes required to be connected with said " junctions. By this arrangement facility is given for uniting " or combining branch pipes with main pipes without the " danger of leakage at the junctions."

The Specification and drawing explain the application of the improvements to joining earthenware drain pipes.

[Printed, 1*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 42; Patent Journal, vol. 7, p. 163.]

A.D. 1849, February 8.—N° 12,465.

TOOTH, WILLIAM.—Tiles for draining, &c.

Parts of the improvements described in this Specification have reference to the construction of water-closets and chimney-pieces. They further relate to machinery to be used in the preparation of clays and other materials, for the purpose of separating the finer from the coarser particles. The finer portions are caused to pass through a sieve by means of atmospheric pressure.

The invention finally relates to the manufacture of drain tiles and pipes by means of dies or "dods" which have no bridges. Some of these dies, as illustrated and described, turn out tiles in segmental and angular forms which may be used for gutters or combined to make drains. For instance the drain or sewer may be built of brick and arched over by segmental tiles. Or a segmental tile almost forming a tube itself, may be made into a complete tube by a segmental cap. Or again segmental tiles may be grooved and tongued together, their edges being so shaped for the purpose. These segments may also be joined over a mould when in a plastic state. In these cases the dies are plates perforated with angular or curved or segmental slots through which the clay is forced, but complete pipes may be made by means of another die in which the core is supported by a bar placed vertically in the material chamber and round which the piston or plunger works.

[Printed, 2*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 141: Patent Journal, vol. 7, p. 216.]

A.D. 1849, February 28.—N° 12,495.

JACOB, CHARLES.—This invention consists simply in a mode of arranging apparatus for making sockets on earthenware tubes or pipes, whereby a socket is produced on a partially-formed tube or pipe by the application of a socket mould. It is shown applied to a machine, such as has been heretofore used for manufacturing earthenware tubes without sockets, and consists of a pug mill or cylinder, containing a vertical axis, furnished with inclined blades, by the action whereof the clay or other plastic matter is forced through a moulding orifice at the bottom of the cylinder.

[Printed, 2*s*. 4*d*. Drawings. See Repertory of Arts, vol. 14 (*enlarged series*), p. 216; Mechanics' Magazine, vol. 51, p. 212, and Patent Journal, vol. 7, p. 226.]

A.D. 1849, April 16.—N° 12,566.

PIRON, Louis Prosper Nicolas Duval.—"Improvements "in tubes, pipes," &c.

The invention consists in making pipes, &c. by placing beton or concrete (a composition of broken stones and hydraulic lime) between two surfaces of sheet iron. The pipes, "either for "gas, water, or other liquids or fluids" are made by ramming the concrete into the sheet iron moulds. The metallic tubes are left uncovered for a few inches at each end to facilitate joining. The joint is made good with some of the same substance with which they are constructed. For other purposes, such as "the construction, of bridges, roads, tunnels," &c. similar applications of concrete combined with a double surface, are indicated. For instance, the inventor makes hollow "cov- "ings" of sheet iron, which when put together would form a segment of a circle of a complete tube, and which are solidly filled with the concrete. He also makes large tubes or culverts by building up concrete round an iron tube, framing being fitted to the interior of the tube to prevent distortion during the ramming.

[Printed, 8*d*. Drawing. See Mechanics' Magazine, vol. 51, p. 378; Patent Journal, vol. 8, p. 67.]

A.D. 1849, April 26.—N° 12,584.

THOMPSON, Thomas Harcourt.—"Certain improvements "in apparatus for preventing the rise of effluvium from "drains, sewers, cesspools, and other places, and in apparatus "and machinery for regulating the levels of waters in rivers, "reservoirs, and canals."

This invention relates,—

"Firstly, to improvements in the construction of apparatus "for preventing the rise of effluvia from sewers, drains, "cesspools, waterclosets, and other places; and I construct "this apparatus in such a manner that the bottom (which "moves on a hinge) shall be retained and kept close up to the "bottom rim of a pan or cylinder by means of an arrangement "of a weighted latch, stop, or click, and that when a certain "quantity of matter, either in a liquid or solid state, shall "have accumulated thereon, it shall suddenly tip and leave "the bottom of the pan or cylinder open, and, when released "of its load, the hinged bottom shall (by the preponderance

" of weight on one side) immediately rise up against and close " to the bottom edge or rim of the pan or cylinder, and be " retained in that position by the arrangement of the weighted " latch, stop, or click herein-after described, until the same " weight of matter has again accumulated thereon, when it will " immediately tip up again and release itself as before; and " in order to effect a better and closer joint, I fix a ring of " vulcanized india-rubber, gutta percha, leather, or any other " suitable or elastic material to the bottom edge or rim of the " pan or cylinder.

"Secondly, my invention relates to an arrangement of apparatus more especially applicable to waterclosets, for preventing the rise of effluvia therefrom, by the action of " which the pan is washed round by a stream of water let in " by the tipping motion of the hinged bottom referred to in " the first part of my improvements; and,

"Thirdly, my invention relates to the construction of apparatus and machinery for regulating the flow of water in " rivers, canals, and reservoirs, cisterns, and other places, " which apparatus and machinery are so constructed and " adjusted that when a certain quantity of water shall have " been allowed to pass from one side thereof to the other, or " from one place to another, the supply or flow of water shall " be stopped."

[Printed, 1s. Drawings. See Mechanics' Magazine, vol. 51, p. 429; Artizan, vol. 9, p. 31; Patent Journal, vol. 8, p. 93.]

A.D. 1849, May 3.—N° 12,601.

WHALEY, Thomas, and LIGHTOLLER, Richard Ashton.—Improvements in machinery for manufacturing all kinds of bricks, tiles, quarries, pipes, and similar articles,—consisting principally in combining a pug-mill, pressing cylinder, screws, and die-plate in one machine. The clay passes through an opening at the bottom of the pug-mill, into a horizontal pressing cylinder below, containing a piston, which alternately advances to and recedes from the delivery end of the cylinder. As the piston advances, it gradually closes the opening, and forces the clay through screens into an inclined trough or mouth piece, and thence through moulding orifices in a die-plate; the moulded clay as it leaves the die-plate, being received by a train of small carriages. When the piston has completed its stroke, it begins to recede; and the bars of clay may then be severed between the carriages by means of wires. A mode of cleaning the screens is described.

[Printed, 1*s*. Drawings. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 163; Mechanics' Magazine, vol. 51, p. 419; and Patent Journal, vol. 8, p. 82.]

A.D. 1849, June 7.—Nº 12,645.

BURTON, Bennett Alfred.—Relates to the manufacture of pipes, tiles, bricks, copings, and similar articles. Consists principally in compressing or consolidating the particles of matter composing such articles. This is effected by taking the article, a cylindrical pipe for example, as it emerges from the moulding orifice, and passing it through a set of four rollers, having their peripheries turned to such a shape that when placed together they will form a circular hole, somewhat smaller in diameter than the pipe which is to be compressed. The compressing rollers and appendages may form a distinct machine, or they may be combined with the apparatus used for making the pipes, which consists of two upright cylinders for receiving the clay, cast together upon a sole plate, which turns on a stud, so as to bring each cylinder in succession beneath a piston, whereby the clay is forced through a die at the bottom of the cylinder, and on to a long hollow mandril extending to the compressing rollers. The number of rollers and the shape of their peripheries will vary according to the form of the article to be compressed.

Also making bends for pipes or bend pipes by placing the core eccentrically in the die. Likewise machinery for forming rabbet or socket and screw joints on the ends of pipes, and cutting rabbet joints upon the ends of hollow bricks or tiles, by means of rotating cutters against which the pipes, &c. are held.

[Printed, 1*s*. 8*d*. Drawings. See Mechanics' Magazine, vol. 51, p. 572; Practical Mechanics' Journal, vol. 2, p. 250; Engineers' and Architects' Journal, vol. 13. p. 12; and Patent Journal, vol. 8, p. 153.]

A.D. 1849, June 27.—N° 12,677.

WILSON, William, junior.—Cutting pipes.

The object of the inventor is to cut pipes or tiles when in a plastic condition, so that the end of one pipe may be cut out of the next, the one having a convex end the other consequently having a concave recess into which the former will fit.

The apparatus designed for this purpose and illustrated in the Specification, consists of a pair of horses joined at one end by the necessary gearing and hollow to receive the cutting tools. The workman receives two tubes on the horses, and by turning a handle attached to the gearing he rotates a wheel, which first forces the axes of the cutters outwards, the effect of which is to cause the curved cutter blades to protrude through the plastic tiles, and the continued rotation of the handle will then cause the axes and cutters to revolve and thus cut the tiles into parts.

The ends at the severed parts will therefore be concave and convex, according to the cutters. The still further rotation will then draw the axis back and cause the cutters to fall back into their original position and admit of the tiles being removed.

The inventor claims that a machine may be made to cut from the outside if desired, and it may further be made to cut more than two tubes at a time.

[Printed, 1*s.* 4*d.* Drawings. See Repertory of Arts, vol. 15 (*enlarged series*), p. 70; Mechanics' Magazine, vol. 51, p. 616; Patent Journal, vol. 8, p. 153.]

A.D. 1849, September 20.—N° 12,784.

MARSDEN, Charles.—“ Improvements in traps to be applied “ to closets, drains, sewers, and cesspools.” The improved trap consists of “ a drum or series of buckets caused to revolve “ by the weight of the matters falling into the same, and made “ air-tight by overhanging and side flaps of vulcanized caoutchouc or other suitable substance.”

[Printed, 8*d.* Drawing. See Mechanics' Magazine, vol. 52, pp. 238 and 273; Patent Journal, vol. 9, p. 11.]

A.D. 1849, October 12.—N° 12,798.

LOWE, Joseph.—“ Certain improvements in grates or grids, “ applicable to sewers, drains, and other similar purposes.”

This invention consists in converting the ordinary “ grates “ or grids ” into stench traps. Under the “ grate ” is formed a box in which are two partitions, the one rising from the bottom nearly to the top, the other descending from the top nearly to the bottom. Water remains in the box up to the height of the former partition, and forms a "water-sealed-joint" between the partitions for the purpose of preventing the escape or return of effluvium.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 371; Mechanics' Magazine, vol. 52, p. 115; Practical Mechanics' Journal, vol. 3, p. 167; Artizan, vol. 8, p. 156; also vol. 9, p. 95; Patent Journal, vol. 9, p. 45.]

A.D. 1850, January 11.—N° 12,922.

BURTON, Bennett Alfred.—"Certain improvements in apparatus connected with sewers, drains, and cesspools, also in suction and delivery pipes, and in connecting such pipes or hose, the apparatus connected with sewers, drains, and cesspools, being applicable to other like purposes."

The improvements comprise—

Firstly, several arrangements for flushing. Most of these contrivances are framed on one principle. The sewage or water accumulates in a chamber and raises a float, which when it has reached a certain height, opens the door or valve by means of levers. The valve or door closes by its own weight. For flushing house drains, a cistern is divided by a partition; each half has a valve communicating with the drains to be flushed. Water runs from the main, through a swing conduit into one half. While the water is flowing in, a ball float rises, and when this float has reached a given height, it opens the valve allowing the water to rush into the drain, and at the same time turns the water supply into the other compartment, when the operation is repeated. In a modification of this plan a double cistern, or rather the halves of one cistern, oscillate on a knife edge and so open and shut the valves.

Secondly, a valve for pumps, &c. This simply consists in fitting the end of a flexible pipe with metal plates, which when compressed, close the lips of the pipe.

Thirdly, means of connecting pipes. In one method there is a strap having a hook in one part, which grips the two flanges of the pipes. At the opposite side of the strap is a slot to receive a key, which, when driven in, bears against the side of the flange and draws the joint tight. Another method consists in using three jointed levers, over which is passed a ring, so that by driving the latter over the levers, the heel of each of them is made to press or force the flange of one pipe against the other. Pipes may also be constructed with a slot on one and a stud on the other. The two engage in a kind of bayonet joint, and a short length of flexible piping is placed over all and secured by wire or other suitable means.

Fourthly, a contrivance for emptying cesspools. A cylinder carried on a wheeled framing is placed in communication with the cesspool by means of a hose. A vacuum is created in the cylinder, either by condensing steam or by drawing out a piston, and on a valve being opened, the contents of the cesspool are forced by atmospheric pressure into the cylinder, which is then drawn away.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 53, p. 56; Patent Journal, vol. 9, p. 189.]

A.D. 1850, February 21.—N° 12,976.

MAYO, William. — Connecting pipes of earthenware and glass.

The inventor places the end of a pipe in a mould and pours in melted metal, preferably tin, which when cool forms a flange or collar round the end of the pipe. Two of these pipes may then be joined by a screw union, but the joint may be varied if desired.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 16 (*enlarged series*), p. 228: London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 104; Mechanics' Magazine vol. 53, p. 158; Practical Mechanics' Journal, vol. 3, p. 179; Patent Journal, vol. 9, p. 287.]

A.D. 1850, March 7.—N° 12,989.

FOWLER, John. — 1. Improvements in ploughs and machinery for draining land, and for introducing pipes or suitable materials for the purpose of drainage into the hollows produced by such ploughs. The apparatus consists of a carriage, supporting an upright coulter, which extends downwards into the earth, and carries at its lower end a shoe or share (similar to a mole plough), whereby a small channel or trench is formed at any required distance below the surface, and as the pipes are strung like bugles or beads upon a rope connected to the shoe, they are drawn into the channel or trench as the shoe advances.

2. Using wooden pipes for draining land; machinery for manufacturing the same; sawing longitudinal openings or slits in the sides of the wooden pipes for the admission of water.

3. As a substitute for drain pipes, twisting heather into the form of a rope, and drawing such heather rope into the trench formed by the shoe or share.

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 53, p. 218; and Patent Journal, vol. 9, p. 271.]

A.D. 1850, April 27.—N° 13,064.

ELLIOT, William Gilbert.—(*A communication*).—Manufacturing bricks, tiles, drain and other pipes, culverts and other articles from clay or other plastic material, by melting such clay or other plastic material in a suitable furnace, and running the same, when fluid or semi-fluid, into moulds or casts of the articles to be produced.

[Printed, 4*d.* No Drawings. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 317; Mechanics' Magazine, vol. 53, p. 299, and vol. 57, p. 448; Engineers' and Architects' Journal, vol. 13, p. 231; and Artizan, vol. 9, p. 114.]

A.D. 1850, May 22.—N° 13,076.

COTGREAVE, Robert.—Cutting drains.

The apparatus designed by the inventor for this purpose consists of a kind of plough, which excavates the drain by successive cuts, somewhat after the manner of a plane. The coulter is followed by an inclined plane, fitted with a mould board, and as the plough advances the slice of earth taken off by the coulter passes up the incline and is turned off the mould board. Various devices are shown for facilitating this removal of the earth, such as rollers let into the inclined plane and rotating spikes to catch the soil and draw it up. In the fore part of the plough there is an adjustable guide piece which travels over the surface of the last cut and so regulates the depth of fresh cut to be taken by the following coulter.

A machine is also provided for filling in the drains when the tiles are in place. It consists of a frame fitted with a number of tines or spikes to loosen the earth, which is afterwards drawn in to the centre by scrapers and caused to fall into the trench.

A plough for loosening the subsoil so as to effect an improved drainage, is also described.

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 268; Mechanics' Magazine, vol. 53, p. 437; Patent Journal, vol. 10, p. 117.]

A.D. 1850, May 30.—N° 13,087.

DIXON, Edwyn John Jeffery.—The greater part of the improvements described in this Specification refer to shaping articles such as sinks, chimney tops, &c. out of slate and stone.

They also include a method of trapping such sinks. This trap consists of an annular space cut out of the solid, round the top of the waste pipe. The flanges of the trap cover drop into this annular space, the edge of the cover resting in a rebate also cut out of the slate. The trap cover is of metal and is perforated with holes to allow the fluid to run through it into the annular space and thence into the drain. The inventor also describes a method of fitting bulls'-eyes and other glasses in street paving for giving light to underground places.

[Printed, 3s. 10*d*. Drawings and Woodcut. See Mechanics' Magazine, vol. 53, p. 457; Patent Journal, vol. 10, p. 270.]

A.D. 1850, June 1.—N° 13,088.

PAGE, Thomas.—"Improvements in the construction and "means of cleansing sewers."

The sewage is received in a reservoir above the ordinary low water level. This reservoir communicates with the river or tide way by means of a series of culverts, provided at each end with sluices. Over the culverts and on a level with the high-water mark is another reservoir, communicating by sluices with the culverts beneath it at the sewage reservoir end. The water tank is filled by the tide at high water. The plan works as follows:—While the tide is high the sewage is allowed to fill the culverts. The sluices between the sewage tank and culverts are then closed. As the tide falls and while the egress sluices are still covered, they and the sluices communicating with the water reservoir are simultaneously opened. The weight of the water acting at the upper end of the culverts forces the sewage out against the tide water. As soon as this is done, the egress sluices are shut as well as those of the water tank. The culverts are now full of water, and when the tide has fallen somewhat more, the culvert sluices at each end are opened, and now the weight of the sewage in the sewage tank forces out the water and takes its place in the culverts. The sluices are then closed, and at the next tide the whole operation is repeated.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 17 (*enlarged series*), p. 40; London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 343 Mechanics' Magazine, vol. 53, p. 458; Patent Journal, vol. 10, p. 119.]

A.D. 1850, July 25.—N° 13,195.

BELL, Charles William. — "Improvements in apparatus "connected with waterclosets, drains, and cesspools, and gas "and air traps."

This invention consists in "constructing passages of india-"rubber in combination with waterclosets, drains, and cess-"pools, and gas and air traps, in such manner that they will "allow of the passage of sewage and other liquids and matters "suspended in them, gases and other fluids, in one direction, "and will by collapsing prevent the return by the passage of "vapours or matters in the opposite direction."

[Printed, 1*s.* 4*d.* Drawings. See London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 177; Mechanics' Magazine, vol. 54, p. 99; Patent Journal, vol. 10, p. 211.]

A.D. 1850, October 17.—N° 13,285.

FOWLER, John, junior.—Machinery for draining land and for cutting and boring wood for drain pipes.

The inventor proposes to drain land by drawing the tiles through the subsoil by means of a plough. This plough is fitted with a coulter passing down vertically into the earth and having a foot resembling a share in shape. The coulter is capable of being raised or depressed by a rack and gear. To the foot or shoe of the coulter is attached by suitable means the rope which passes through the series of pipes or tubes intended to be drawn into the channel formed by the plough, and at the other end of the rope is a similar contrivance for the attachment of yet another string of pipes. When the plough is drawn forward by means of a windlass, described in the Specification, the pipes are caused to be laid in the soil behind the shoe as the latter progresses. Square or angular pipes may be used as well as cylindrical pipes.

In preparing wood for pipes, it is first cut by means of circular saws supported on a portable carriage, and when these pieces of wood so cut are of shapes that cannot be conveniently directed on the apparatus they are placed in a frame and guided up to the saw. Slots or openings are also cut in the sides of the tubes for admitting or discharging moisture. These pieces of wood are then submitted to a boring spindle which turns them out in the shape of tubes with spigot and faucet ends. The boring tool may also perforate the sides of the pipes.

[*Printed*, 4*s.* 10*d.* Drawings. See Mechanics' Magazine, vol. 54, p. 337.]

A.D. 1851, June 3.—N° 13,653.

ADAMS, William Bridges.—This invention includes numerous improvements in railways and other roads and ways, buildings, bridges, locomotive engines, railway carriages, and waggons, &c. The parts of the invention which relate to draining consist in the use of hollow perforated girders or rails as drain pipes; constructing roads and ways with two surfaces, one above the other, the upper or wearing surface perforated for water, dust, or mud to pass through, and the lower surface impervious, or otherwise, as may be preferred, with an open space between the two surfaces; also, constructing roads and ways in such manner as to make them more solid and firm, and at the same time to drain them better, by using flagstones, slates, or sheets of iron, laid on concrete, to form an under surface, on which perforated iron gratings are to be laid, or if preferred, wood, stone, asphalte, or bitumen.

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 55, p. 476; Practical Mechanics' Journal, vol. 4, p. 226, and vol. 5, p. 65; and Patent Journal, vol. 12, p. 133.]

A.D. 1851, July 22.—N° 13,698.

DUNDONALD, Thomas, Earl of.—"Improvements in the "construction and manufacture of sewers, drains, waterways, "pipes, reservoirs, and receptacles for liquids or solids . . . . "from a substance never heretofore employed for such manufactures."

The "substance" alluded to in the title is bitumen, and it is used for making pipes or is rolled into slabs. It may be mixed with other materials, such as petroleum or naptha, to alter the consistency and to soften it.

[Printed, 10*d.* Drawing. See also Repertory of Arts, vol. 19 (*enlarged series*), p. 289; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 186; Mechanics' Magazine, vol. 56, p. 98: Engineers' and Architects' Journal, vol. 15, p. 34.]

A.D. 1851, October 9.—N° 13,769.

OATES, Joseph Pimlott.—Machine for manufacturing bricks, tiles, quarries, drain pipes, &c. It consists of a hopper or pug mill, the upper part whereof has the figure of an inverted cone. The middle portion is cylindrical, and the lower part (termed the "rectum") is conical or funnel shaped, terminating in a rectangular figure, corresponding in form and size to the length and breadth of the brick to be produced. The vertical shaft of the mill is furnished with inclined knives on the upper part, and with a continuous blade or screw below, fitting the cylindrical part of the hopper. Immediately under the "rectum" there is a frame which contains two moulds, open at top and bottom, and slides between two metal plates or plane surfaces. The clay, after being tempered by the knives, is forced by the screw from the "rectum" into the mould beneath, and then, by the movement of the frame, the filled mould is carried beneath a piston, and the empty mould is brought under the hopper. The sliding of the frame between the plain surfaces smooths the upper and lower faces of the brick; and while the empty mould is being filled, the piston descends, and forces the brick from the mould on to an endless web. For making tiles and other articles, the "rectum," sliding frame, and pistons are removed, and another "rectum" and dies of suitable shape are substituted.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 56, p. 316.]

A.D. 1851, October 23.—N° 13,788.

ADCOCK, Henry.—Making pipes, chimney pots, bricks, tiles, copings, columns, &c., by "melting the mineral, rock, or " stoney substance known commonly as basaltes trap, rowlen " rag, or whinstone, or minerals of such like structure, and " belonging to the same geological genus, and running the " same in a fluid state into moulds suitably formed for pro" ducing castings of the shapes and forms desired."

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 21 (*enlarged series*), p. 45; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 196; and Mechanics' Magazine, vol. 56, p. 375.]

A.D. 1851, December 8.—N° 13,850.

PIDDING, William. — " Improvements in the treatment, " manufacture, and application of materials or substances for " building purposes."

The patentee proposes to "make bricks, slabs, blocks, tiles, " pipes, or other forms or shapes, from combinations of broken " stone, scoria, muriate of alumina, or acetate thereof, mineral " earths, fluxes, wood or wood dust, commonly called sawdust, " coal, coke, papier maché, naptha, vegetable fibres, pitch, " glue, gutta percha, and other articles possessing the re-

" quisite properties," which substances are combined or used separately with cement made of sulphates of alumina and lime, borate of soda and silica.

The patentee also describes as a "mode of rendering bricks " more durable, firmer, and fitter for sewers" and other places where impervious bricks are desirable, which is "to prepare a " composition of finely ground or precipitated silica, with " about one fourth of its quantity of soda or potash, subjecting " the mixture to such a temperature as will cause it to fuse." The bricks are then varnished with any common varnish, to which the above composition is then applied and re-fused. Or the bricks may be coated with a vitreous enamel by dusting the varnish with powdered glass. Colour may be also added if required.

[Printed, 4*d.* No Drawings. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 110; Engineers' and Architects' Journal, vol. 15, p. 238; Mechanics' Magazine, vol. 56, p. 499.]

A.D. 1851, December 19.—N° 13,864.

CLAYTON, HENRY.—Relates to the manufacture of tubes, pipes, tiles, and other articles from plastic materials.

1. Improved dies or moulds for forming large pipes and other articles, the cores whereof are supported in such manner as to leave a clear space for the material over and through the moulding orifice.

2. Producing socket and other joints on pipes and other articles by forming such articles with an enlargement and extra thickness of material at the end or sides, and, when requisite (and previously to burning), removing a portion of the material from the enlarged or thickened end, side, or sides by means of the tools described under the third head.

3. Tools or apparatus for cutting "square rebated," grooved, tongued, bevelled, chamfered, or other form of jointings on pipes, tiles, and other articles.

4. A skeleton framework for receiving and supporting pipes in the course of formation.

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 20 (*enlarged series*), p. 91; Mechanics' Magazine, vol. 56, p. 515; and Artizan, vol. 10, p. 254.]

A.D. 1852, April 6.—N° 14,054.

OATES, JOSEPH PIMLOTT.—The invention forming the subject of these Letters Patent is the same as N° 13,769. By the former Letters Patent the invention was protected in England, Wales, and the town of Berwick-upon-Tweed; and these Letters Patent were granted to extend the protection to the Channel Islands and Colonies.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 57, p. 319.]

A.D. 1852, April 29.—Nº 14,100.

McGLASHEN, Stewart.—Making drains.

Part of this invention has reference to apparatus for cutting drains. Suppose the drain be intended to be six feet deep, two feet wide at the top and one at the bottom :—A frame of T iron, ten feet long and two wide is laid upon the top of the drain. Cutters or spades are then driven in by mallets, screws, or other means. A bar of iron or wood is next placed across the handles of the cutters, and extensors with a right and left hand screw are applied to each of these which act on the spades or levers and the frame as a fulcrum to compress the earth between the spades. Two tresses are then put on each side of the drain; two beams of wood, with a hole in the centre for the screws to pass through, are laid across them. A screw being passed through each of these beams takes hold of the end of the frame, and the screws being put in motion, the mass of earth is raised sufficiently to allow the drain to be formed with stones or tiles. When this is done the mass is lowered into its old position.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 57, p. 394; Engineers' and Architects' Journal, vol. 15, p. 428.]

A.D. 1852, May 8.—Nº 14,122.

GILLESPIE, William.—An instrument for ascertaining the slope or level of drains, &c.

This instrument consists of a framing of wood the upper and lower sides of which are parallel.

To the upper side is hinged by one end a bar having at the other end a vertical bar at right angles, and furnished with a scale. This bar is also provided with a quadrant passing through the upper side of the frame and capable of being clamped thereto in any position. To ascertain the slope of the land the frame is placed upon it in a vertical position. The upper side of the frame will then be in an incline exactly corresponding with the slope. The hinged bar is now raised from the upper side until the vertical bar above named is found to be truly vertical by means of a plummet or spirit level. When this is ascertained the bar is clamped and the rise read off by the scale. Consequently if the upper side of the frame be two feet long, for example, and the rise be found to be two inches, the slope of the ground will be two inches per two feet.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 57, p. 416.]

A.D. 1852, August 23.—N° 14,273.

JENNINGS, Josiah George.—Drain traps.

This trap consists of an iron vessel containing within it a hemispherical or other shaped cup or basin, for holding water. The lid of the outer vessel is the grid of the drain, and its under surface is provided with a conical pipe or funnel the lower and smaller end of which dips into the water contained in the cup, thus forming the trap.

Another part of the invention has reference to waterclosets, in which the basin and trap are combined in one piece, and are "so formed that the basin is made to contain a quantity of " water independant of the water constituting the water joint " or trap."

[Printed, 1*s*. 10*d*. Drawings. See Mechanics' Magazine, vol. 58, p. 197.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 138.

PEACOCK, Richard Atkinson. — (*Provisional protection only.*)—Making oval drains of several pieces, moulded or formed at their edges with grooves and projections, so as to fit together and produce the oval form required. The parts may be put together in such manner as to break joint longitudinally.

[*Printed, 4d.* No Drawings.]

A.D. 1852, October 2.—N° 154.

BROWN, David Stephens.—(*Provisional protection only.*)—Ventilating and obtaining useful products from sewers.

This invention consists in ventilating town sewers by drawing the foul air from them by means of fan blowers or other instruments. This air, which contains a considerable portion of ammonia, is treated with carbonic or other acid in the chamber into which it is drawn by the fan. A salt of ammonia results, which may be removed from time to time.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 5.—N° 238.

ELLIOTT, William Gilbert.—Manufacturing bricks, pipes, tiles, and other articles capable of being moulded, from the slag of the smelting or blast furnaces of iron works, or from a fluid mass of the nature of such slag, by running the same into moulds, and pressing, stamping, or rolling, and gradually cooling or annealing the moulded masses.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 6.—N° 250.

GILBEE, William Armand.—(*A communication.*)—Disinfecting "drains, sewers, and similar receptacles."

This invention relates chiefly to the composition and preparation of a disinfecting powder. It further relates to a method of distributing this powder in the place to be disinfected. For this purpose the inventor uses what he calls an intercepting plate attached to the aperture into the cesspool or other place. The soil pipe passes through this plate, and into a scoop hinged underneath it. This scoop is supplied with water, and is so constructed that after having been opened by the weight of the falling sewage, it closes again by the weight of a counterpoise, and retains a sufficient quantity of water to receive the dry matters and intercept their exhalations. This intercepting apparatus or scoop is provided with a pipe through which a sufficient quantity of the disinfecting powder is conducted into the scoop, and escapes each time the scoop opens.

[Printed, 10*d*. Drawings.]

A.D. 1852, October 9.—N° 319.

JOHNSON, JAMES.—"Improvements in heating, ventilating, " and sewering cottages or dwelling houses."

The improved method of sewering combines both inside and outside drainage. For the outside, the inventor constructs " the sewers in the shape of a V or sharp angle, to prevent " stoppages," and he makes communication between these sewers and certain cavities or flues in the walls of the building, " so that all the slops or waste water may be discharged at " once through the said cavities . . . . without the trouble " of carrying it outside the houses . . . . All the water from " the roofs of the houses will also pass down through the said " sewers."

Instead of having a separate chimney to each house the inventor proposes to construct a common chimney for all or several. He would then convey the smoke from all the fires under the houses to the common chimney "by means of " tunnels or culverts, which keep the foundations and walls " perfectly dry, and heat the rooms under which they pass."

[Printed, 6*d*. Drawing.]

A.D. 1852, October 12.—N° 346.

PERKES, SAMUEL.—"Certain improvements in mines, build" ings, and sewerage, for effecting sanitary purposes, and " treating the produce therefrom."

The inventor proposes to ventilate "mines" by laying a conduit or main in the galleries. This main has a number of openings to allow ingress of the vitiated air, and it terminates above ground in a furnace, or is fitted with centrifugal exhausting fan. He also sprinkles about a "solution of lime" to correct the air in the "mine."

A portion of the Specification is taken up with a description of improvements in warming and heating buildings, and other points not comprised within this series of abridgments.

The inventor proposes "to form a complete main sub-sewer " or sewers below the lowest part of the lowest sewer as now " in use," and into this all the existing sewers would discharge. In order not to interfere with traffic, he proposes to drive a tunnel through the ground and line it as he proceeds with cast-iron segments. These segments are fitted with rails about half way up, so that carriages may run upon them above the level of the sewage. These carriages are to be used when inspecting the sewer, or to carry a system of rotating paddles to cleanse it. The sewer is to be ventilated by high shafts of brick or stone or iron. The sewage is to be received in a tank, whence it is to be raised to the surface by pumping or in short lifts by means of rotating paddles worked by steam engines. A process of utilizing the sewage matter is described.

[Printed, 8*d*. No Drawings.]

A.D. 1852, November 5.—N° 656.

DUNDONALD, ADMIRAL, the Earl of.—Treating bitumen for pipes, &c.

For these purposes the patentee prefers to use the "natural "cohesive bitumen of Trinidad or New Brunswick." These natural bitumens require to be "pounded, sifted, and masti-"cated, with about one-tenth of their weight of unctuous oil, "then to be rolled, and thoroughly washed by an alternating "or rotatory crushing motion or other device in tepid water." "The materials thus rendered homogenous, tenacious, and "plastic" may be used for making pipes for the distribution of liquid manures. They may also be mixed with gummy and resinous matters, and made into water pipes.

"Sixty parts of Trinidad bitumen, five parts of rosin, five "of shellac, or other indurated gum, and ten of viscid anti-"septic oil and salt amalgamated as before explained, with "twenty-five per cent. of caoutchouc, produce a good and "lasting mixture, admirably suited for the joining together "of all kinds of pipes, whether by pouring it hot into their "bell-mouthed ends, as lead is now used, or by caulking it in "a waxy state, combined with strands of rope or other fila-"mentous substances, and wedging up the cohesive and "elastic juncture. These plastic joinings are peculiarly "adapted by their flexibility for connecting earthenware pipes, "especially those built into the walls of dwelling houses, "where the settling of the masonry cranks their present rigid "connections, to the great injury of public health, from "noxious emanations."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 9.—N° 684.

DUNN, Thomas, and **WATTS,** William, jun. — Draining ground around railway sleepers.

This invention partly consists "in constructing railway "sleepers with holes or with pipes through which the wet and "moisture from the surrounding ballast is carried off, thereby "keeping the ballast in a fit state."

In some forms the upper portion of the sleeper is circular, and "to the centre is cast an inverted cone pierced with small "holes to admit the moisture in the ballast to drain through. "The lower end of the cone is open, and to it is fitted the "nozzle of the drain pipe, which is also pierced with holes." "The drain pipe is conveyed into a gutter or side drain "running between or alongside the line of rails." In marshy ground the cone may be furnished with a screw to give firmer hold to the sleeper. Another method is to make use of bridge rails for the purpose, either by themselves or with the addition of a plate of metal below them. Or the sleepers may be formed in the shape of tubes, perforated and joined with the drain pipes. Another plan is shown by the addition of a sheet or cast metal trough to the under side of a wooden sleeper. Many ways of carrying out the invention are indicated; indeed the drawing embodies as many as forty-two figures.

[Printed, 8*d*. Drawing.]

A.D. 1852, November 15.—N° 759.

ROGERS, Abraham.—"Improvements in apparatus used for "forming sewers, tunnels, and ways."

This invention "consists of constructing an arched frame "composed of arched ribs of iron, on the upper surfaces of "which are applied several long metal plates covering the "arch, and which are made capable of sliding longitudinally "in a frame, so that they may be moved forward in succession "whilst the arched frame remains stationary; and it is preferred that these long plates should, at their fore ends, be "provided with cutting edges, in order that they may cut into "the earth, if desired, as they are forced forward, so that "when all the plates have been forced forward any distance, "and the arched ribs have also been moved forward, they will

" offer an arched roof over the space covered thereby, and " the workman will be protected from the falling in of the " earth."

[Printed, 6*d*. Drawings.]

A.D. 1852, November 17.—Nº 771.

WAY, John Thomas, and PAINE, John Manwaring.—Relates to the manufacture of burned and fired ware, comprising bricks, tiles, pipes, artificial stone, pottery, porcelain, &c., consists in employing in such manufacture a stone clay (found in Surrey and which will probably be found in other parts) composed largely of soluble silica; and also in combining clay, lime, and other materials with reference to the quantity of soluble silica present (whether naturally or artificially obtained), in order to vary the character of the burned and fired ware produced.

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 27.—Nº 898.

SCHOTTLANDER, William Edward.—(*A communication from Emil Schott.*)—" Improvements in machinery for boring " the ground, stone, or rocks, for the formation of drains and " sewers, or for the laying of pipes underground, and for " removing obstructions therein, also in the manufacture of " pipes to be used in connection with such machinery, and in " instruments for surveying and levelling preparatory to the " boring operations."

In the case of soft earth a wedge-shaped boring tool is pressed forward by means of a machine, and in the case of stiff earth or rock a screw-shaped borer is used to which rotary motion is imparted. The boring tubes, with the boring tool fitted to the front of them, are placed at the level of the proposed boring to be made. The machine above the level is connected with them, and causes them to press forward into and through the soil, either by pressure or rotary motion. As soon as one length of tube has made its way into the soil, another is connected either by a bayonet joint or screw coupling, or any other convenient means. In clay soils and some others no pipes will be required to be placed, but in soft soils earthenware or other suitable pipes may be inserted.

In the pipe-making machine " the clay is supplied through a " *hopper* into a cylinder which has an opening into a *mould-* " *ing frame.* On the clay being supplied into the cylinder,

" the piston forces it against an under piston, and opens the " aperture into the moulding frame, into which the clay is " forced by the descent of the first piston, and from which " the pipes issue. On the ascent of this piston the lower " piston follows it a certain extent, closes the aperture; and a " partial vacuum being thus formed, a supply of clay is forced " from the hopper by its own gravity and pressure of the " atmosphere into the cylinders, and the operation repeated." The clay is forced through dies or orifices fitted with central cores. Suitable apparatus for preparing the clay is described.

The Specification also describes a new surveying instrument.

[Printed, 2*s*. Drawings.]

A.D. 1852, November 30.—N° 917.

BIRCH, John Brannis, and BIRCH, Eugenius.—" Improve- " ments in forming drains and introducing pipes or tubes into " the earth."

The invention consists in "combining a screw with appa- " ratus for penetrating the earth and introducing therein " tubes or pipes." The screw is carried at the end of a bar upon which are threaded the pipes. The screw is turned by means of a capstan without rotating the pipes, which are however forced after the screw by a collar on the shaft. The head of the screw is recoved by sinking a hole for it, but in "plac- " ing drain pipes into cuttings and through and at the back of " retaining walls, the screws" "may be formed for remaining " in, the rods being made with a key which enables them to be " re-drawn." A modification is also described for inserting pipes under rivers and watercourses; "the screw in this case " may be made so as to allow the soil to pass through the " tube if necessary."

Means of inserting and joining the pipes are shown.

[Printed, 6*d*. Drawing.]

A.D. 1852, December 4.—N° 961.

CLIFF, Joseph.—Improvements in making and compressing bricks, lumps, tiles, quarries, pipes, &c. They consist in the use of steam pressure in lieu of mechanical or hydraulic pressure in the making of bricks or other articles from disintegrated or pulverized clay, or from clay otherwise prepared; and also in compressing bricks, pipes, or other articles by the use of steam pressure, whether made by the above or any other process. In the machine described for effecting the first part of the invention, a small steam cylinder communicates an intermittent rotary motion to a circular horizontal table, having four pairs of moulds or openings, each fitted with a plate capable of sliding up and down therein. Each movement of the table brings a pair of moulds beneath a hopper filled with clay; the next movement carries the filled moulds beneath a pair of pressing plates, actuated by another steam cylinder, whereby the clay is compressed into the form a brick; the succeeding motion places the moulds over a discharging apparatus, which forces out the bricks; and the next movement brings the empty moulds beneath a projection on a descending arm, which forces the plates to the bottom of the moulds.

Bricks, lumps, tiles, quarries, terra cotta, and similar solid articles are compressed in a machine similar to the above, but without the feed hopper. In the machine for compressing pipes, the pipe is put on a mandril or core, and placed in a horizontal semi-cylindrical die or mould; an upper semi-cylindrical mould is then forced down by steam pressure, whereby the pipe is compressed, and at the same time, by means of semicircular knives on the ends of the moulds, it is cut to the proper length; after this the core is turned round so as to polish the internal surface of the pipe.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1852, December 11.—N° 1030.

GREEN, Stephen.—"Improvements in joining earthenware " tubes and pipes."

"Heretofore, in connecting earthenware pipes and tubes by " sockets, each pipe or tube is made with a socket." Now this invention consists in "employing separate sockets of " metal, each of which receives the ends of two tubes or " pipes; and allows of packing or cement to make the whole " fluid tight." A modification of this system is described, in which the socket is not external to the pipes, but is really an iron ring which fits as a dowel in corresponding grooves made in the thickness of the pipes and at the ends to be joined. This ring is also cemented in its place.

[Printed, 6*d*. Drawing.]

A.D. 1852, December 14.—Nº 1057.

JENNINGS, Josiah George.—(*Provisional protection only.*) —"Improvements in constructing drains."

This improvement consists "in making drains of concrete "in the cutting without previously moulding. The channel "being cut, a portion of the concrete is put in, and then a "tube or core is laid on it; more concrete is then applied, "and, when sufficiently bored, the core is withdrawn, and "by continuing this operation any length of drain may be "made."

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 16.—Nº 1077.

BLADES, Richard.—"Improvements in the method of cleansing sewers and drains, and in the machinery or apparatus "connected therewith."

The inventor provides the sewers with man-ways at suitable distances. "When it is desired to cleanse any part of the "sewer or drain, the man-ways above and below that part "must be opened. A small float . . . . is then to be placed "in the water at the upper opening, and floated down to the "lower opening by means of the stream." The float is attached to a fine cord; thus a communication is established between the two openings. "By means of this line (or a "stronger one attached thereto) one end of a chain of suitable strength is next drawn through and is then attached to "a crab winch. . . . . Suitable dredging or excavating tools "are then attached to the chain and drawn through, followed "by buckets, scrapers, and sweeping brushes. The mud, "sand, silt, or other deposit is thus swept down to the lower "opening, whence it can be raised in buckets, or in any other "convenient manner, after which the sewers or drains may be "flushed with water. In the event of any sewer or drain "becoming entirely obstructed or silted up, a communication "between two manways or openings must be established by "means of a jointed rod."

[Printed, 8*d*. Drawing.]

1853.

A.D. 1853, January 13.—N° 94.

UREN, Edward Wills.—Making bricks, pipes, tiles, imitation or artificial stone, and peat bricks for fuel, by means of a machine consisting of a pug mill, formed with a series of openings in the bottom, through which the clay or other plastic material is forced by a cone, carrying a set of screw blades, and fixed on the vertical shaft of the mill; then, by means of slides or pistons (one beneath each opening), the clay is pressed into chambers and through dies or moulds, and, on issuing from the dies, the moulded clay is divided into suitable lengths by self-acting cutters. Instead of using the slides or pistons, the clay may be pressed into the chambers by screws.

[Printed, 1*s*. Drawings.]

A.D. 1853, January 22.—N° 168.

PAUL, Joseph.—(*Provisional protection only.*)—"Im-" provements in machinery for making drains in land."

This invention relates to "a machine with a line of stampers, " each formed at its lower end of the form of the desired " drain. These stampers being allowed to fall repeatedly on " the land penetrate to any desired depth. The carriage is " then moved a distance equal to the length of the line of " stampers, and the stampers are again and again allowed to " fall till another length of drain is completed; or in place " of depending on the gravity of the stampers, mechanical " means may be added to force the stampers to penetrate into " the land."

[Printed, 4*d*. No Drawings.]

A.D. 1853, February 5.—N° 320.

WHITEHOUSE, John, and WHITEHOUSE, John.—Manufacturing knobs for doors, basins, cups, pipes, handles, artists' colour pans, &c. from powdered earthy materials, instead of using these materials in a plastic state. Employing dies with moveable parts, compound dies, and divided or segmental dies, in machinery wherein the compression of the earthy material is effected by the descent of a piston or plunger, or by forcing the dies or moulds upwards against a stationary block. Improvements in roses for door-lock knobs, and in preventing drawer and other like knobs from coming off furniture.

[Printed, 1*s*. Drawings.]

A.D. 1853, February 8.—N° 335.

BELLFORD, Auguste Edouard Loradoux.—(*A communication.*)—Laminated asphalte for rain-water or drain pipes, gutters, &c.

The asphalte or bitumen is melted, passed through a sieve, and then between rollers, which are regulated to the thickness required to give the sheets. Above the rolls on each side, are placed rollers from which continuous paper or canvas, or even metallic fabric, is unwound " in order to give the rolled sheets " greater solidity and more uniform surface." Another similar roller may be placed vertically above the rolls and the fabric passed down through a channel made in the sieve, so that when rolled it is incorporated in the sheet of bitumen. " This sheet " serves as a foundation to the laminated matter and adds to " its solidity. The cloth or paper may be dispensed with."

The welding of the sheets is effected by heat, or when cold, by a kind of glue, composed of oil, resin, tar, and asphalte in powder, or even by compressing the edges one on another.

[Printed, 8*d*. Drawing.]

A.D. 1853, February 12.—N° 370.

STANFORD, John Fordham. – (*Provisional protection only.*)—" Draining buildings and open and enclosed spaces " in cities and town, &c."

The inventor, after pointing out that the ground, under houses, &c. is not drained from its dampness because of the imperviousness of the sewer and drain pipes, describes the method by which he proposes to rectify the evil. He says, " I intend to put an earthen or other pipe or tube through " the side of the sewer or drain near to the bottom thereof " in a sloping position downwards to the inside of such sewer

" or drain, and the outer end of such pipe or tube to be " curved, and to be inserted into a closed air-tight trap of " earthenware or other suitale material, and fitted with a self-" acting valve to prevent the fluid in the sewer or drain from " passing into such trap. I then put water into said trap " until it discharges by the pipe into the sewer or drain; I " then insert another bent earthen or other pipe or tube into " the said trap, with the end turned down about 3 inches into " the water in said trap; the other part of said pipe passing " through the side of said trap at a higher level than the pipe " leading to the sewer or drain. I then close the said trap, " and make all the joints air tight. The other end of such " pipe being open and prepared to receive another length of " tube or pipe, I add common earthen drain pipe with un-" cemented or closed joints thereto laid in channels sunk into " the ground to any length or in any direction required, and " fill up said channels with rubble."

[Printed, 4*d*. No Drawings.]

A.D. 1853, February 15.—N° 396.

WHITTON, William Blissett, and WHITTON, George Samuel.—Relates to that class of pipes (particularly those of large diameter) made by forcing clay or plastic materials through moulding dies or orifices; and consists in making the dies or orifices with a number of small cores around the main core, whereby longitudinal openings will be produced in the sides of the pipes, in place of such sides being made solid as heretofore,—the object being to cause the pipes to dry and burn better than when made solid.

[Printed, 8*d*. Drawing.]

A.D. 1853, February 16.—N° 403.

MACKAY, George Gray.—Manufacturing earthenware drain pipes in two distinct valves or segments, divided longitudinally along the centre, the junction edges being stepped or made so as to overlap each other slightly and form a firm secure joint. Segmental bricks may be used for a similar purpose, instead of half pipes, and the transverse sectional area may be of any required shape.

[Printed, 6*d*. Drawing.]

A.D. 1853, February 22.—N° 450.

HUDSON, James, and HUDSON, Thomas Bamford.—Machinery for forming bricks, tiles, and drain pipes or tubes. Prepared clay is introduced into a hopper, whence it is conducted downwards by three screws to the compartments of a sliding frame, and compressed into the same by a plunger or plate; then by the movement of the frame, the filled compartments are carried from beneath the hopper, and brought opposite a row of forcers, whereby the bricks are ejected from the compartments, and at the same time, such movement brings a corresponding number of empty compartments beneath the hopper.

When the machine is to be used for producing tiles, drain pipes or tubes, and perforated or hollow bricks, the sliding frame and parts acting therewith are removed, and a plate with suitable moulding orifices is placed opposite the plunger.

[Printed, 8*d*. Drawing.]

A.D. 1853, February 26.—N° 488.

BLANCHARD, Mark Henry. —(*Provisional protection only.*)—Producing drain or sewer pipes or tubes (made of earthenware, clay, or similar materials) of sufficient strength with a less quantity of material than is usually employed. This is effected by making the pipe of two thicknesses of material, *i.e.*, of two pipes, one within the other, with an annular space between them,—the outer and inner pipes being connected together by narrow partitions, which run longitudinally along the annular space. The pipes are made without flanges, and are connected together by means of dowels, which enter the annular spaces at the ends of the pipes.

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 14.—N° 904.

ADAMSON, Joseph.—Flushing sewers.

The invention "consists in having a cistern, of any required
" dimensions, fixed on two pivots, at a suitable distance from
" the centre the shortest end being weighted so as to keep it
" from upsetting when empty, the other end terminating with
" a syphon. Water in suitable quantities is allowed to flow
" into the cistern, so that when it is filled the weight of water

" preponderating over the short weighted part of the cistern " empties itself suddenly into the " sewer.

[Printed, 6*d*. Drawing.]

A.D. 1853, April 20.—N° 951.

WEIGHT, Samuel.—" Improvements in ventilating mines, " sewers, or drains, ships, buildings generally, and other " localities."

The principle of the invention is described by the patentee as consisting :—" in the use and application of a rotary fly " placed within a funnel or conical-shaped cast or sheet iron " or other metal box or casing, to which are connected tubes " for exhausting and discharging the contents of a receiver " placed " near the bottom of the place to be ventilated or dis- " charged of the foul air contained therein ; said receiver is " connected by suitable tubing to the box or casing in which " the rotary fly is placed, and there is other tubing connected " to said receiver, which tubing is conducted to all parts of " the place to be ventilated." When desirable several receivers connected by tubes or pipes may be employed.

[Printed, 8*d*. Drawings.]

A.D. 1853, May 9.—N° 1134.

BEAUMONT, Edward Blackett.—Gutter bricks and water pipes.

This Specification has reference to improvements in building. The inventor uses among other things gutter blocks or bricks, which also serve as bases from which the arch of the roof may spring. The necessary fall is given to them, the bricks " being " numbered in the moulding that they may be jointed to each " other in their numerical order." They are perforated and socketted to receive the socket head of the rain water pipe.

This pipe, which is of earthenware, is made up of lengths of ordinary socketted pipes. Each length is supported by passing it through an orifice in a projecting brick built into the wall. The orifice is fitted to the external shape of the socket, and the pipe therefrom hangs by this part. The pipe fits into the gutter as above described, between the joints of two gutter bricks or otherwise. " If fitted under, a short branch pipe is " moulded underneath the gutter brick which fits into the " socket of the pipe."

[Printed, 8*d*. Drawings.]

A.D. 1853, May 10.—No 1151.

JOHNSON, John Henry.—(*A communication.*)

Agricultural machine, suitable for cutting drains, &c. "The " machine consists of a common box cart with two wheels " about five feet in diameter with broad tires" and drawn by horse power. "Immediately in front of the axle is placed an " upright tubular boiler and engine; from the axle of the " cart, and outside of the wheels is suspended a framework " extending about eight feet behind the cart, to the extremities of which framework is suspended a revolving cylinder " into which are affixed a series of steel pointed picks, spades, " or knives; the framework is supported by a platform attached to the axle of the cart, and arranged on two wheels " rolling immediately in front of the cutting cylinder of equal " tire, but less in diameter than the cart wheels. An apparatus and screw is attached to the platform for raising and " depressing the whole framework and cutting cylinder to any " required gauge; the cutting cylinder derives its motion " from the steam engine, the gearing being attached to the " axle of the cart, the whole being suspended from a common " centre." The horse power is only applied to the draught of the apparatus, but steam power may be used for this also if preferred.

For draining, the length of the cylinder is reduced, "the " apparatus being so arranged as to admit of its cutting to any " required depth."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1853, May 11.—No 1167.

WHITAKER, Edmund, and WALMSLEY, James.—Machinery for making pipes, &c.

This machinery is designed for the purpose of using the elastic force of air as the expressing power.

The expressing plunger is worked by an overhead air cylinder, after the manner of a steam hammer, and works into a chamber containing the clay. The clay is forced out through a die at the bottom of the chamber in the form of a pipe, and the latter is received on a hollow mandril supported on a table. This table is carried by a piston working in a small air cylinder, in such a manner that before the pipe is made the table may be raised until the mandril comes against the underside of the core of the die. The pipe is now expressed until the mandril is covered. Then the pressure of the plunger is arrested and the table with the mandril slightly lowered, so that a space may be left between the mandril and the die sufficient for the passage of the cutting instrument. The tube and mandril are then removed and a new mandril substituted.

Another method is shown, by which water power is used to work the expressing plunger. In this machine water is first pumped into a cylinder or air vessel which communicates by a pipe with another air vessel. As the water is pumped in, the air in the latter becomes highly compressed, and acting on the supply of water in the other maintains a constant pressure when the water is to operate on the piston of the clay press.

[Printed, 6*d*. Drawing.]

A.D. 1853, May 31.—N° 1335.

SHOEBRIDGE, William Frederick.—(*Provisional protection only.*)—Making openings with suitable covers in earthenware and other drain pipes, which, being laid down in known localities, can be got at and the state of the interior of the drain ascertained with facility, and any impediments removed.

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 1.—N° 1347.

DUNDONALD, Admiral the Earl of.—Apparatus for laying drain or other pipes in the earth, consisting of a carriage or beam, having a coulter or cutter for vertically parting the earth, and a horizontal tool attached thereto, similar to that of a drain plough, whereby a channel is formed for the reception of the pipes, which descend through an inclined passage from the upper and foremost part of the carriage, and are continuously deposited in the channel,—the pipes being connected for this purpose by a rope, which is preferred to be elastic.

Forming one end of each pipe with a concentric knob, which fits into a cup or circular segment on the end of the next pipe, in the manner of a ball-and-socket joint.

[Printed, 6*d*. Drawing.]

A.D. 1853, June 3.—N° 1365.

WILSON, James Spotswood.—Machinery for cutting drains, &c.

This machine consists of a number of wheels or cylinders placed on an axle, each cylinder being furnished with curved pick-shaped prongs. These prongs are so curved in relation to the size of the wheel upon which they are mounted, that "each point where it comes in contact with the ground represents a segment of the curve which a point on the periphery "of the wheel would describe at each revolution while travelling over the ground, in consequence of which the pick-shaped "digging points receive the direct pressure of the wheel "throughout their length, and as the wheel passes over, the "position of the picks in relation to the surface becomes "gradually reversed, so that they rise out of the ground at "right angles to the line at which they entered, lifting the "soil with them." In fact the curve of the picks or spades form part of the cycloidal curve described by the wheel. Mould boards are added to turn over the excavated soil, and cutters precede the rotating picks to cut the surface into breadths corresponding with the distance between each set of digging points.

[Printed, 8*d*. Drawing.]

A.D. 1853, June 4.—N° 1384.

WHITEHEAD, John. — (*Provisional protection only.*)— Relates to the "collaring" or "socketing" of clay or earthenware pipes, and consists in the use of a stationary supporting frame, contrived to carry the socket or collar mould upon a graduated incline, in such manner that the mould may be raised or lowered at pleasure, to suit long or short pipes,—the plunger being worked by a lever in the usual way at a fixed height.

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 16.—N° 1463.

GIBSON, James William.—A new system of paving and surface draining of roads.

The road blocks are placed on a substratum of iron plates dovetailed on each side. "The upper surface of the iron" "is made available for carrying off the surface water into the

" side drains, gradually forming a slight incline from the " centre of the road."

The inventor proposes to prevent surface mud by under drainage. "About two-thirds down the block on either side" is cut a hollow into which is introduced "a perforated tube or " spiral wire covered with canvas, about two inches diameter, " running parallel across the road, forming by its size about " seven eighths of an inch distance between each block, the " space or groove over which to be filled with gravel or sand, " thus filtering all water passing through the same through " the canvas tube into the channel which directs to the side " drains; these channels are formed by the distance between " each block and the angles from the bottoms of each taken " off. The iron foundation being the conductor to the side " drains."

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 20.—N° 1511.

MACPHERSON, Allan.—(*Provisional protection only.*)—Disinfecting sewers and drains.

For the purpose of collecting and destroying the noxious gases of sewers in their course, chambers of proper form and convenient height are excavated in the main sewers. Into these chambers the patentee proposes to introduce trays of iron or basket work filled with a mixture of peat or peat charcoal and common salt, which mixture is to collect the ammonia and so far purify the gases. When convenient, chambers may be constructed above the tunnel sewers, communicating with the sewers and having gratings at their tops. "As the noxious " exhalations pass along they will be drawn (in consequence " of the draft occasioned by the gratings aforesaid) through " the chamber so constructed," which being filled with the mixture in trays will deprive the gases of their noxious qualities.

The patentee also proposes to collect the sewage at the mouths of sewers in barges, such vessels being previously provided with a store of the mixture on gratings. The barges will then act as strainers to the sewage, allowing the somewhat purified liquid to escape into the river and removing the solid manure. He also proposes to treat the sewage in tanks.

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 9.—N° 1642.

SPROT, Mark, and DENHOLM, Robert.—(*Provisional protection only.*)—Relates to the manufacture of pipes and tubular articles from clay or plastic materials, wherein the sockets or end junction pieces of such articles are formed at the time of moulding or shaping the plain portion of the pipe or other article. To the delivering end of a pug mill is attached the mould for the socket of the pipe, and within it is placed a core bar, made to suit the intended shape of the pipe and socket. The clay is forced, by the action of the pugging apparatus, into the annular space between the end of the core bar and its surrounding socket, whence it issues through an annular space corresponding to the diameter of the main portion of the pipe at the outer end of the socket. When the required length of pipe has been formed, the machine is stopped; and the clay left in the socket mould, at the moment of stopping, becomes the completed socket for the pipe.

Instead of the pug mill arrangement, the direct pressure of a steam or water cylinder, or any known plan of forcing clay, may be used for pressing the clay into and through the mould.

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 12.—N° 1657.

SAMUELSON, Martin.—Application of hydrostatic power to work brick and tile moulding machines, such as are known as Beart's patent brick, tile, and pipe machines, as well as machines of various other kinds for moulding clay or plastic material. The clay descends from the receiver into a horizontal moulding chamber, having dies or moulding orifices at its two opposite ends, through which the clay is alternately expressed by the traversing movement of a piston. Hydrostatic power may be applied to actuate the piston by connecting it to a double plunger or ram, working at each end in a fixed hydrostatic cylinder; or to a hydrostatic cylinder, which traverses on a stationary piston; or to two rams or pistons, working in a duplex hydrostatic cylinder, and connected together by two bridle pieces; or to the rod of a piston which works in a stationary hydrostatic cylinder at the side of the machine. Steam, air, gas, or other fluid may be used as the motive agent for this machinery instead of water.

[Printed, 1*s*. Drawings.]

A.D. 1853, July 28.—N° 1770.

STANFORD, John Fordham. — (*Provisional protection only.*)—" Draining dwelling houses and other buildings, and " open and enclosed spaces in cities and towns."

This invention consists "in an apparatus or vessel with " pipes thereto, and a division in the same, and fitted with a " floating plug or stopper, by means whereof water is admitted " to pass only one way, and by connecting such apparatus " with common drain pipes sunk in channels in the ground, " and filling such channels with rubble, and connecting said " apparatus with the common drain or sewer," a method of draining the above places and sites is effected.

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 9.—N° 1854.

BRUCK, Louis Hartog.—(*Provisional protection only.*)— " Improvements in the construction of tunnels, sewers, drains, " pipes, tubes, channels, and other like conduits for hydraulic " or pneumatic purposes."

The invention consists in forming conduits by building calcareous cement round a metal core which is afterwards removed. If the pipes required be but small the core may be made of thin cheap metal, and may be left in the cement.

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 17.—N° 1921.

HERITAGE, John.—Application of a mould, die, or mouthpiece, containing water, in front of and in addition to the ordinary moulding orifice of machines or instruments used for the manufacture of bricks, pipes, tiles, coping, and such other articles as are or may be moulded in clay,—the additional mould, die, or mouth-piece being so applied that the stream of clay issuing from the ordinary moulding orifice, after being wetted with water, shall be smoothed by passing through the second mould or die.

[Printed, 8*d*. Drawings.]

A.D. 1853, August 17.—N° 1926.

GRIMSLEY, Thomas.—Machinery for manufacturing bricks, tiles, pipes, and pottery, consisting of a mill for grinding or pugging the clay and crushing any stones or foreign matter, *combined with* apparatus for moulding and pressing the clay.

The top and bottom of the mill are composed of two fluted conical surfaces, free to revolve around a vertical central shaft, and including between them one or more fluted conical rollers, each free to revolve around its own axis only. Motion being given to either surface, or to one of the conical rollers, will cause all the rollers to revolve around their axes, and will impart rotary motion to the top and bottom surfaces in contrary directions. The top surface has apertures to admit the clay, and the under surface is also formed with apertures through which the clay is pressed by the conical rollers into a receiving chamber, and is thence forced by a revolving scraper through apertures in the bottom into mould boxes, where it is subjected to the pressure of a piston and then ejected on to a travelling bed.

If great pressure is not required, the moulds or dies may be placed under the apertures in the receiving chamber; and then by the action of the scraper or coulter the clay will be forced into the moulds or through the dies.

The upper fluted surface may be dispensed with, in which case the lower one is made a fixture, and the conical fluted rollers are mounted on axes projecting from a central main shaft and revolving with it, so as to press the clay through perforations made between the flutes of the under surface.

[Printed, 1s. Drawings.]

A.D. 1853, August 24.—N° 1970.

HILL, Thomas, and THOMSON, Alexander.—Improvements in the manufacture of pipes or hollow articles from plastic materials. The clay is fed into a pug mill or other moulding and supplying apparatus, and forced through a moulding die at the bottom of the clay chamber. The core piece for shaping the interior of the pipe is suspended from the lower end of the main shaft or spindle, or from the lower extremity of a spindle contained within the main shaft. When sockets are to be moulded upon the pipes, the interior of the lower extremity of the die is made to correspond in shape with the exterior of the required socket, and the interior of the socket is to be shaped by a solid core, adjustable from below. As the clay begins to emerge from the working cylinder, it first passes through the plain part of the die, and thence into the wider portion fitted with the socket core piece. As soon as the socket is actually shaped, the bottom core is let down, and, the moulding still proceeding, the plain part of the pipe is moulded, pushing before it the primarily moulded socket.

Instead of the core piece being supported as above described, it may be carried by a spindle standing up from the ground.

[Printed, 1*s*. Drawings.]

A.D. 1853, September 27.—Nº 2215.

CALLAN, Nicholas.—(*Provisional protection only.*)—Protecting iron pipes, gutters, &c.

The iron of any kind or form is coated with an alloy of lead and tin "by first tinning it in the usual way, and then im-" mersing (in the same manner in which iron plates are" immersed in tinning them) into melted lead, covered with" some fatty or oily substance to prevent oxidation, or into a" melted alloy of lead and tin, until the tin on the surface of" the iron combines with the lead or alloy." It is recommended "that such alloy contain as much lead as tin, and not" more than five or six times as much lead as tin. When a" thick coating is required the iron is immersed several times" into the alloy."

"If the alloy with which the iron is coated contain more" than five or six times as great a weight of tin as of lead, or" twenty times as much lead as tin, its protecting power will" be greatly inferior to that of an alloy which contains as much" lead as tin, or only five times as much lead as tin."

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 12.—Nº 2340.

CALLAN, Nicholas.—Protecting iron pipes, gutters, &c.

For coating iron of any kind the inventor makes use of an" alloy of lead and tin, which alloy contains a moderate, but" not an exceedingly great quantity of lead compared with" that of tin," or an alloy of "lead, tin, antimony, and zinc," or an alloy of "tin with one or more of the other three."

It is recommended "that the alloy of lead and tin with" which the iron is coated" should contain "as much lead as" tin, and not more than seven or eight times as much lead as" tin, and that when antimony or zinc is added there be about" one part by weight of each or of either to eight or twelve of" lead."

[Printed, 4d. No Drawings.]

A.D. 1853, October 12.—Nº 2342.

SMITH, Thomas.—(*Provisional protection only.*)—The object of this invention is to submit newly-formed pipes of clay to a regular and considerable pressure in suitable apparatus, whereby the material is consolidated and air and superfluous moisture driven out, and the socket is formed without the addition of more clay or use of water. The clay pipe is made in the usual manner, and allowed to stand until stiff enough to be finished. It is then placed in a cylindrical case or jacket, and a core or plunger, worked by a powerful screw or hydraulic press, is driven down perpendicularly and concentrically into the cylinder or jacket, whereby the pipe is subjected to great pressure and the superfluous material is forced into the space between an enlarged portion of the core at the top and an enlarged part of the jacket, so as to form the socket.

[Printed, 6*d*. Drawing.]

A.D. 1853, October 31.—Nº 2511.

ROVÈRE, Felix Paulin.—Joints for tubular drains.

Instead of joining pipes together with a square or regularly abutting joint in the ordinary way, the patentee bevils the end of his pipe and fits it into a socket having an inclined or splayed abutment instead of the usual rectangular joint. Consequently if the drain should settle somewhat after laying, the joint will be kept more perfect, and will not be so liable to open as with the old system.

The patentee claims "the splay or bevil joint at any angle
" whatsoever with the longitudinal side or axis of the tube,
" pipe, drain, or sewer, as substituted for the 'square' or
" rectangular longitudinal section" "at present in use."

[Printed, 6*d*. Drawing.]

A.D. 1853, October 31.—Nº 2513.

GRAY, John.—A self-acting flushing apparatus.

This invention consists of an arrangement by which a cistern connected with the sewer or other receptable of refuse "can
" be so constructed as at regulated intervals to discharge itself
" with a flush of its contents, and after such discharge return
" by its own action to its former condition."

At the side or bottom of the cistern is placed a valve, attached to which is a connecting line or rod "extending to " one arm of a lever, whose fulcrum is placed at a level " higher than said valve; to the other arm of the lever is " attached by suitable connection a bucket or other suitable " receptacle. Water is supplied to the cistern in the usual " way. When the water attains a certain level in the cistern " an arrangement is made to allow it to flow by a syphon or " other pipe into the said bucket; when a sufficient quantity " has accumulated in the bucket, its weight will overbalance " the valve, and cause it to open, when immediately the " contents of the cistern will be discharged, so as to flush " itself and the sewer or other outlet with which it may be " connected." The bucket is then caused to empty itself gradually through small holes, the balance is reversed, and the valve closed. "To guard against any stoppage of the " small holes in the bucket or injury to its efficiency, and to " secure a certain supply of water into it," it is proposed in certain cases "to construct a separate chamber, either in or " without the cistern, for supplying the buckets, into which " chamber a flow of clean water only is admitted; in this " chamber" is placed a "syphon or other pipe for supplying " the bucket" which acts as before described. "This chamber " may also supply the cistern, and an arrangement be " made for stopping the supply to the cistern and allowing " the water to flow off into the bucket when the contents of " the cistern attain a certain height; the bucket and cistern " may be supplied by separate pipes; the action of the bucket " may be assisted by a float."

[Printed, 8*d*. Drawing.]

A.D. 1853, November 8.—N° 2591.

CHAMBERLAIN, Humphrey.—Relates to those classes of machinery for making bricks and tubes or tiles, in which clay or brick earth is expressed through the orifices of a pug mill or other expressing machinery. In making bricks according to this invention, the clay is continuously expressed through a die or opening, somewhat larger than the required brick, on to an endless cloth; it then passes between four rollers covered with porous fabric, by which the form of the brick is obtained with great exactness; and the moulded brick earth is carried on by endless cloths to the cutting apparatus.

In making tubes, tiles, or hollow bricks two or more grooved rollers are placed in front of the opening of a pug mill or other expressing machine, so as to form the mouth-piece or die; and cores or mandrils are fixed to enter between the grooved rollers. As the plastic clay is expressed, it puts the rollers in motion; and the moulded tube, tile, or brick is received by an endless cloth, and carried to the cutting apparatus.

[Printed, 1*s*. Drawings.]

A.D. 1853, November 12.—N° 2629.

AUSTIN, William.—"Improvements in apparatus for trap-" ping passages into sewers or drains."

The improved apparatus consists of "a box or vessel " through which the passage into the sewer or drain passes, " but in such manner as to leave space below the upper part " of such passage and the bottom of the vessel or box, which " space is to receive and retain the heavier matters, sediment, " and floating matters. Over the upper part of the passage " is placed an inverted bell or vessel with a grating at its " lower part so as to prevent the passage of matters into the " sewer or drain with the water, except such as can pass " through the perforations of the grating, and the box or " vessel of the trap is covered by a grating. When for rain-" water pipes, the inverted vessel may be dispensed with; " and when syphon pipes are used I apply a cylinder at the " upper end of the bend having in it a float with a rod and " valves so as to indicate when the syphon has become " stopped."

[Printed, 6*d*. Drawing.]

A.D. 1853, November 19.—N° 2691.

AUSTIN, William.—Forming the exterior surfaces of tubes or tiles made of brick earth, or clay, or plastic material, or glass, in such manner that they will pack together without loss of space between them, and thus facilitating stowage and carriage, as well as in some cases the use of such tubes or tiles. For this purpose the dies through which the clay or plastic material is forced are each made with six equal sides, so as to produce six-sided tubes. The tubes or tiles may be made in two or more parts, each composed of equal sides or parts of equal sides, so that when brought together they will form tubes or tiles having exteriorly six equal sides.

[Printed, 6*d*. Drawing.]

A.D. 1853, December 3.—N° 2814.

ROGERS, Abraham.—(*Provisional protection only.*)—"Im-
" provements in ventilating sewers, mines, or other subter-
" ranean works."

The patentee proposes to connect the sewers with coke ovens or gas-making apparatus, and so draw the foul air through the fire.

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 5.—N° 2825.

STOREY, Thomas.—"Improvements in the construction and
" arrangement of apparatus employed in connection with
" sewers."

This invention consists in the employment of a metallic man-hole cover divided into compartments, into each of which material suitable for paving may be inserted in order to form a safe surface for horses and carriages to pass over. "The
" centre portion of this cover is perforated, the spaces open-
" ing from above and expanding into the chamber beneath,
" to allow of the exit of foul air or gases, and a central space
" is adapted to admit of an elevating key. The gulley is com-
" posed of cast iron or other metal, and is arranged so as to
" provide a receptacle for any solid particles which may pass
" the channel grate, to effectually trap the sewer, and prevent
" any solid body from passing other than will easily pass
" through the drain, and to afford a ready means of cleaning
" the gulley drain and sewer or drain with which it is con-
" nected. It consists of a rectangular or other shaped
" receptacle for the street drainage, the solid matters resting
" at the bottom. A lip dips into this receptacle so as to form
" a complete and effective stench trap. In connection with
" the receptacle before mentioned is a pipe leading down to
" the sewer, the receptacle and pipe being fitted respectively
" *with grating* and closed lid, or one lid may be made to cover

" both, by which means the pipe and sewer may be easily " flushed by a hose when required.

[Printed, 1*s*. Drawings.]

A.D. 1853, December 10.—Nº 2876.

MACPHERSON, Allan.—Disinfecting sewers.

The inventor makes use of peat and other charcoals alone or in combination with sulphuric or other mineral acid, or common salt, or hydrate of lime, or in some cases, with quick lime. Brick dust, clay, and soot are also used. The materials are carbonized in a kiln which also forms part of the improvements described in this Specification.

For arresting noxious vapour in sewers, the inventor excavates chambers of suitable size and form in the sewers. He places trays of the antiseptic composition in these chambers in such a position that the air is compelled to pass them on its way from the sewer to the traps in the chambers for emission of air.

He also suspends baskets of composition to the top of the sewer, but the results of this method are not considered to be so perfect. He further places similar stores under the street gratings.

He describes a plan of collecting sewerage from the house drains into tanks filled with the composition, and from which the deodorized water is strained into the sewer, leaving the residuum of solid manure behind. When sewers empty themselves into rivers, he makes use of barges for the purpose of separating the solids.

[Printed, 6*d*. No Drawings.]

A.D. 1853, December 22.—Nº 2976.

WOODHOUSE, William Henry.—(*Provisional protection only*.)—Constructing roads, ways, and ducts.

The inventor says, " my improvements consist in constructing " roads and ways of a combination of iron or other metal ribs " with wood, concrete, stone, or other like suitable material. " I cast a framework of iron, open at top and bottom, and " leave a space of about 4 inches, more or less, between each " of the ribs forming the frame, and I fill up this space, when " the frames are used for the roadway only, with wood, con-

" crete, stone, gravel, or other suitable substances. I cast " the frames in convenient sizes" "and bolt them together " at the sides. My improvements in ducts, such as channels " for drains, for pipes, &c., consist in covering them with " similar frames to those above mentioned, but I cast each " rib together with the inner sides of the frames with a flange " or projection at bottom, and fill in the spaces between them " with wood, stone, or other like solid material, which has its " bearings on the flanges or projections at the bottom of the " ribs and inner sides of the frame."

These ducts may be inspected through traps in the foot pavement, and for placing pipes, &c. the covering frame could be removed and replaced.

[Printed, 4*d*. No Drawings.]

1854.

A.D. 1854, January 18.—N° 118.

BATTEN, William.—(*Provisional protection only.*)—Sink, drain, or gulley trap.

The apparatus is as follows:—" An outer pan, chamber, or " receptacle, for the receiving of all liquids of admixtures in " their passages into pipes, drains, sewers, cesspools, or " receptacles. This chamber may be made of any form, size, " or capacity, and the materials of the same may be of any " metal or pottery ware. The outer covering or lid of said " chamber to be a perforated plate or grating, through which " all liquids or admixtures enter the chamber; the bottom " of said chamber terminating with an open pipe, for the " emptying of the chamber and conveying away of all liquids " or admixtures. To the under surface of said lid is attached " a tube open at its lower extremity, having arms or lateral " projections to secure the position of said tube in the centre " of the chamber. Over and upon the internal opening of the " pipe belonging to the lower part of the chamber is placed a " ball, so as to prevent the entrance of all noxious vapours " through the lower pipe into the said chamber. Over the " ball is placed the lower opening of the interior tube within

" which the ball acts, and which is attached to under surface " of the lid or grating."

[Printed, 4*d.* No Drawings.]

A.D. 1854, February 3.—N° 267.

FONTAINEMOREAU, PETER ARMAND le Comte de. — (*A communication.*)—Cement for constructing sewers, &c.

This cement consists of a mixture of one part of bitumen, preferably from Trinidad, and in a state of fusion, with two to three parts sand. The fused mass may be cast in moulds. " For constructing canals, sewers, and cesspools," the inventor employs "blocks composed of broken brick, stones of all " kinds, mixed with the said bitumenous cement," and " made in wooden moulds of the form required. These " blocks are cemented together by bituminous cement."

[Printed, 4*d.* No Drawings.]

A.D. 1854, February 7.—N° 293.

MOSELEY, JOHN WARBURTON. — (*Provisional protection only.*)—Joining glass and clay pipes.

The patentee uses india-rubber and gutta percha for this purpose. He rolls the gum "round the extremities of the " closely approximated tubes, having first sufficiently softened " these substances by the application of heat." The bands are more tightly confined by a "wrapper of cord." For large pipes, the gum is dissolved in "some chemical solvent to a " proper consistence for its being spread on a bandage" to surround the tubes. He also proposes to encircle the joints of such tubes with rings or segments of cylinders of india-rubber or gutta percha.

The patentee's system is claimed by him to afford advantages for drainage.

[Printed, 4*d.* No Drawings.]

A.D. 1854, March 15.—N° 619.

OATES, JOSEPH PIMLOTT.—Relates principally to such machines for making bricks, tiles, pipes, &c., as have moveable boxes or dies, open at top and bottom, and in which bricks or other articles are made by forcing a column of clay into the same; but part is applicable to other machines. Consists chiefly in preparing and forcing a continuous stream or column of clay into moulds or dies, open at top and bottom, and providing for the ready escape of the surplus clay during the filling of the moulds or dies. The clay is introduced into a vessel or mill furnished with an upright shaft, carrying screws at its upper and lower ends, and provided with pug knives in the intermediate space. By the lower screw the clay is forced into a chamber below, in which it assumes a sectional figure resembling that of the mould, and thence through the mould into a channel termed an "expanding and contracting rectum," the contracted bottom whereof preserves the clay under pressure. As the filled mould slides away, the empty one moves under the chamber. The bottom face of the brick is planed or smoothed, as it passes from under the chamber, by the edges of slots in the plate on which it slides. The filled mould stops beneath a plunger, which descends and forces the brick from the mould on to an endless web.

[Printed, 8*d*. Drawing and woodcut.]

A.D. 1854, April 17.—N° 881.

HAWKINS, Thomas.—Ventilating apparatus.

The principle of this invention consists "in causing the " wind to act upon or against a surface slanting obliquely " upwards, whereby its course is turned or changed to such " upward direction, the consequence being to create an upward " current or draught of air."

The invention is claimed as capable of various applications, amongst others to ventilating drains. The aperture of the drain to be ventilated is covered with a grating the bars of which slope obliquely upwards, and by deflecting the wind induce an upward current from the drain.

[Printed, 8*d*. Drawing.]

A.D. 1854, May 6.—N° 1015.

JENNINGS, Josiah George.—Improvements in the manufacture of earthenware pipes for drains and sewers, in order to facilitate the operation of laying the pipes, and to render drains and sewers easily accessible for the purpose of cleansing, repairing, &c. Consists in constructing what may be called *junction* or coupling pipes, which are each made in two parts or halves, with sockets at the ends to receive the ends of plain pipes; and such junction or coupling pipes are, when requisite, made suitable for receiving branch pipes and bends. Also, making pipes for drains and sewers with screw or spiral ribs exteriorly (to increase the strength thereof), by causing the clay or plastic earth to be forced through revolving dies.

[Printed, 6*d*. Drawings.]

A.D. 1854, May 12.—N° 1057.

WAITE, William.—Formation of blocks or pieces for the construction of sewers, drains, or pipes from irregular fragments of stone, or from gravel, sand, or other suitable materials, conjointly or separately, caused to adhere and made into a compact mass by means of bituminous cement, and lined or inlaid with glass, earthenware, zinc, or other suitable metal or material. The blocks or pieces may be cast in moulds in the form of lengths of pipe, or segments of a circle, or other suitable shape.

Strengthening pipes so constructed, or pipes made of any other material or materials, by means of longitudinal sleepers or strips of wood, laid under and cemented to the same.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 16.—N° 1091.

MANWARING, George, and SUMMERS, William Alltoft.—"Improvements in supplying water for waterclosets, for the "flushing of drains, and for general purposes."

"Water is admitted into a closed reservoir through a two "way cock; at the top or upper part of the reservoir is an air "valve, which is closed by a float inside the reservoir, and "which shuts the air aperture when the water rises to a given "height in the reservoir." When the water is to be drawn off the two way cock is turned, thus closing the water main and opening the pipe leading from the reservoir. The outlet pipe is preferred to be larger than the supply pipe, in order that a large body of water may be liberated.

[Printed, 8*d*. Drawing.]

A.D. 1854, May 22.—N° 1142.

STOREY, Thomas.—(*Provisional protection only.*)—"Improvements in stench traps."

"This invention relates to an improved construction of " gully grate, which acts as a stench trap, whereby a small " evaporating surface is attained in conjunction with a large " cess box, and consists in the employment of an inclined " spout placed immediately under the grate and attached " thereto by small rivets. This spout consists of a dished " plate, with an oblong opening in the centre, formed with a " mouth-piece underneath projecting into the cess box, and " acting when the latter is full, or nearly so, as a stench trap. " The cess box is supported in the gully frame or outer box " by suitable brackets, and may be taken out for the purpose " of cleaning, when required. The water and dirt is conveyed " down the spout through the central opening into the cess " box, whence it flows over the sides and enters the service " pipe, which may be a syphon or other arrangement for " trapping the stench."

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 26.—Nº 1171.

LIVINGSTON, Allan, junior.—Making earthenware pipes for drains and sewers with an aperture in each length of pipe, in such a manner as to afford access to the interior thereof on the removal of the cover belonging to such aperture.

[Printed, 6*d*. Drawing.]

A.D. 1854, May 30.—Nº 1196.

DOULTON, Henry.—"An improvement in the manufacture " of junctions for sewers and drains."

"The object of this invention is to manufacture junctions of " clay or brick earth suitable for bonding in with bricks in " constructing brick sewers, each junction being formed with " a socket suitable for the end of the size of the clay or stone-" ware pipe it is to receive. For this purpose, each junction " is made, by preference, of a rectangular form, corresponding " in thickness with the brickwork of the sides of brick sewers, " so as to build or bond in with the brickwork. The inner " surface is formed, by preference, somewhat concave, and the " outer surface somewhat convex, to agree with the figure of " the sewer. Each such block is formed with a socket, either " within its thickness or protruding beyond it, to receive the

" end of a pipe, and the form and diameter of the passage " through the block is made to correspond with the pipe its " socket is to receive."

[Printed, 6*d*. Drawing.]

A.D. 1854, May 31.—N° 1207.

ROGERS, Abraham.—(*Provisional protection only.*)—" Improvements in the mode of ventilating mines, sewers, and " other subterranean works; likewise for the warming and " ventilating of all kinds of public buildings."

The inventor simply claims the method of ventilating by connecting the place to be ventilated with a shaft or chimney, which shaft is also in connection with coke ovens or other heat producers.

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 8.—N° 1269.

BLACKBURN, Bewicke.—Forming pipes by binding and cementing small slates together in a cylindrical form, the pieces of slate being so disposed as to overlap and break joint with each other and thus form a kind of wicker or woven work, consisting of slates and iron cemented and concreted with asphalte or other suitable cement.

Hoop iron or iron wire is used for interweaving with and binding together the pieces of slate. Iron collars and sockets are employed for connecting the pipes and for attaching the branch pipes thereto.

The invention is applicable to "field drains," &c.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1854, June 17.—N° 1318.

HINDE, George James.—" A new or improved combination " of materials to be used for the manufacture of pipes or tubes " for drains."

The invention relates to a method of glazing ordinary clay pipes. The composition for this purpose consists of one hundred parts, by weight, of ground calcined flints, the same quantity of " Cornish stone, such as is used in the manufacture " of porcelain," twenty-five parts of bone ash or phosphate of lime, and one hundred parts of borax. These are ground and

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The "spouts or troughs" are made out of plates or sheets of metal by means of a machine consisting of "two jaws mounted "on standards, so as to be capable of being brought together "and separated, as required, by means of screws, such jaws "when together forming a cylindrical opening, within which "is placed a mandril, as much smaller in diameter than the "said opening as to leave a space between them equal to the "thickness of the plate out of which the spout or trough is to "be made. On one of the jaws is formed a semi-cylindrical "cavity of the proper size, into which one end of the plate "may be forced by means of a bar brought down upon it "through the agency of a set of levers, united in their action "by a rod or handle passed through them, the other end of "the plate being at the same time held in proper tension by "its connection with the mandril, which has been turned so "as to bring the plate into its required position. There is "also a forming bar or die with a semi-cylindrical cavity, "corresponding with that in the jaw above-mentioned, in such "a manner as when brought over it to form a cylindrical "cavity. This forming bar or die is worked from a centre, by "means of a set of levers, similar to those before mentioned, "and made to press at the required time upon a circular rod "or mandril laid upon the end of the plate that has been "forced into the cavity in the jaw, and thereby form the spout "or trough."

[Printed, 4*d*. No Drawings.]

A.D. 1854, July 21.—N° 1604.

KNIGHT, JOHN, and **STUBBS**, JAMES. — Improvements in the manufacture of bricks, tiles, pipes, &c.; applicable also to the manufacture of fuel, and to other mixing and tempering processes.

1. Introducing steam or water (either hot or cold) into the cylinders or piston boxes of brick machines and other machines for fashioning clay and other plastic materials.

2. Using a second die or mouth-piece in brick and other machines to act on the roughly-moulded stream of clay as it leaves the ordinary mouth-piece. Steam is introduced into the second die, for the purpose of warming and more readily moulding the clay; and this die may also be used for coating the clay with *any colouring*, glazing, or other material.

3. Impressing bricks, tiles, and quarries with devices or inscriptions by means of rollers.

4. Fixing cores or bars in the dies of brick-making machines, —the cores being so placed between the piston and the interior of the dies that the perforations made by the said cores are closed before the stream of clay leaves the machine.

5. Moulding artificial fuel into masses, having perforations therein; and using nitre or nitrate of soda in the composition of artificial fuel.

6. Employing a friction sheave for driving brick machines; and giving motion to the pistons of brick machines by means of a rocking shaft.

[Printed, 6*d*. Drawing.]

A.D. 1854, July 21.—N° 1606.

CALLAN, NICHOLAS.—Protecting iron and other gutters, &c., by coating them with an "alloy of lead and tin, in which the "quantity of lead is at least twice or three times as great in "weight as that of tin."

The invention further consists in coating brass and copper with this alloy, and also in coating iron, copper, and brass with an alloy of lead, tin, zinc, and antimony, or with an alloy of tin and antimony, or finally with an "alloy of tin with any two "of the other three metals."

The metals to be protected are first coated with tin or one of its alloys, and are then dipped into the molten lead or antimony, or into any of the above alloys in a molten state. The metals may also be coated by dipping them when properly cleaned into baths of the molten alloys.

The inventor does not limit himself to exact proportions in his alloys, but in his Specification he lays down directions which he considers preferable to follow in this respect.

[Printed, 4*d*. No Drawings.]

A.D. 1854, August 10.—N° 1751.

UREN, EDWARD WILLS.—(*Provisional Specification only.*) —Machine for making bricks, pipes, tiles, and artificial stone from clay and other plastic materials. The clay is introduced between a pair of conical rollers into an upright cylinder, wherein it is acted on by pugging knives affixed to a central shaft; and, after being sufficiently pugged and tempered by the knives, it passes from the cylinder at the bottom between rollers, whereby it is pressed into moulds carried by rotating tables; suitable scrapers being fixed to the central shaft, below the rollers, for the purpose of scraping the clay into the moulds. Other rollers and scrapers are also provided, to further press and consolidate the clay in the moulds on leaving the mill, and to scrape the superfluous clay from the top of the moulds. In each mould there is a small frame or brick carriage, which rises, as the mould is carried by the rotation of the table from beneath the mill, and forces the brick upwards out of the mould.

[Printed, *4d.* No Drawings.]

A.D. 1854, August 21.—N° 1835.

SMITH, William Henry, BESSEMER, Henry, and LONGSDON, Robert.—Making pipes, &c. of slag.

The slag is run from the blast furnace into melting pots of fine clay, wherein it is kept in a melted state until sufficiently refined. It is then poured into moulds and annealed. It may be coloured or figured in various ways.

For hollow articles, such as drain pipes, &c., having "a "plain, circular, or polygonal section," a metal mould is constructed, truly bored or planed, and of a slighly conical form, "of which shape the core is also to partake. The mould "thus composed is fitted to a suitable frame, so arranged that "the core may be counterbalanced and made to slide out "quickly immediately that the tube or other article is sufficiently hardened. A sliding pusher or lever is also to form "part of this moulding apparatus, and is for the purpose of "forcing out the pipe or other article when formed; but in "some cases" it is found preferable "to make the exterior "portion of the mould sufficiently large to admit of a lining "of sand, against which the fluid slag is cast, and in which "the pipe or column cast may be removed to the annealing "oven."

[Printed, *3s. 2d.* Drawings.]

A.D. 1854, August 29.—N° 1888.

GRAY, John.—Self-flushing apparatus for cisterns, sewers, pipes, &c.

Inside the water cistern the inventor provides a smaller cistern which he calls the "float chamber." In this float chamber there is a cylindrical float, free to rise and fall with the level of water in the said chamber. The water flows into the outer cistern until it rises above a lip in the float chamber, when it begins to fill the latter. As the float chamber fills, the float rises, and when it reaches a fixed height it opens a valve in the outer chamber and sets free a body of water. The same movement opens a smaller valve in connection with the float chamber, and thus a gradual discharge of water from the latter allows the float to descend, to close the valves, and begin again. The invention also includes apparatus for measuring the water.

[Printed, 10*d*. Drawing.]

A.D. 1854, September 14.—Nº 2004.

RAWLINSON, Robert.—Valves for drainage and sewerage works, &c.

This valve is designed more especially for localities subject to the effects of tidal or flood water.

"The ball or spherical mass answering as the valve" "may " be made of tin, glass, iron, copper, gutta-percha, or other " material, so as to be buoyant in water. This ball is arranged " inside a pipe or valve chest in such a position and manner " that when it is exposed to pressure from below it rises and " presses with its upper side against a valve seating above, " thus preventing the passage of any liquid upwards through " the pipe or valve chest. When the ball is not acting by " pressure from below, it will rest upon a lower valve seating " in the casing or valve chest, and in this way it acts as a " stench trap. When water flows into the pipe or casing " from above, the ball floats and permits the liquid to pass off " beneath it, and then settles down as before. Similarly the " influx of water from below carries the ball up against its " upper valve seat to prevent overflow above."

[Printed, 10*d*. Drawing.]

A.D. 1854, October 3.—Nº 2126.

COOPER, Thomas.—1. Improvement in the manufacture of *earthen pipes* (such as drain pipes) by moulding them in two parts or halves, having alternate projections and depressions on their edges, which, when the two parts or halves are brought together, interlock and unite them, thus forming a complete pipe.

2. Mode of joining earthen pipes by forming short lengths of suitable dimensions in two parts or halves, with alternate projections and depressions on their edges, and putting two of these pieces together around the ends of two cylindrical pipes, with a suitable cement interposed.

[Printed, 6*d*. Drawing.]

A.D. 1854, November 22.—Nº 2468.

GIBSON, Charles.—(*Provisional protection only.*)—Machinery for manufacturing bricks, tiles, and drain pipes. The moulds, which are open at top and bottom, are mounted either in a circular or rectangular frame (being arranged, by preference, in pairs), and caused to move alternately under a hopper to receive the clay, and under a descending piston or plunger, by which the moulded articles are discharged on to an endless band. The hopper is provided with rotating feed rollers for forcing down the clay into the moulds; and the moulds, whilst being filled, stand over a table. For making hollow bricks, tiles, and pipes, suitably-shaped cores are fixed in the moulds. If desirable, the moulded articles may be discharged by pistons acting below the moulds.

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 29.—Nº 2509.

ABRAHAM, John.—Draining.

This invention consists in forming perforations in "drain " pipes or passages, extending from their outer to their inner " surfaces in an oblique or angular direction, and in extending " the upper or higher ends of the pipes or passages sufficiently " above the surface to be drained, so that they can be readily " flushed."

" These improvements are chiefly applicable to the draining " of ash-pits or cesspools, the drain pipes or passages being " placed vertically within the pit, the openings in the drain " pipes or passages having the lower part of their lateral " angular openings on the outer side; by which arrangement, " ashes or other solid matter, being thrown against or coming

" in contact with the pipes, will not be liable to fill up the " holes, and the pipes or passages may be readily cleaned by " water thrown in from the heads of the pipes or passages, to " facilitate which it is proposed to provide lids or covers for " the tops of the pipes or passages."

[Printed, 6*d*. Drawing.]

A.D. 1854, December 11.—N° 2603.

STEVENS, Nehemiah Edward.—(*Provisional protection only.*)—" Joining or connecting together blocks of stone and " other building materials."

This invention "consists in connecting blocks of stone, wood, " bricks, or other materials by means of a groove and tongue, " circular or of any other form ; and although applicable for " general purposes, is specially so for arches and culverts." It is considered " that by this method of forming arches centering would be avoided and mortar or cement would be " unnecessary, except perhaps, for pointing the joints."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 18.—N° 2661.

GILPIN, William, and BOWEN, Abraham.—(*Provisional protection only.*)—Furnaces and ovens.

The patentees thus describe their invention :—" By means " of angular bars placed in the door of the furnace, and which " may also be applied as grate bars, we prevent the radiation " of heat from the furnace or oven. A further improvement " consists in affixing an extra door or slide to the door already " formed of angular bars, whereby the supply of air to the " furnace may be regulated. Also, by means of a machine " constructed in the form of a screw, and which we propose " to term 'the Archimedian fan exhauster,' we exhaust or " draw from furnaces or sewers all smoke gases, or other " volatile residuum."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 23.—N° 2713.

WALKER, James.—(*Provisional protection only.*)—Direct application of the elastic force of steam for dislodging plastic clay from the receiving chambers of pug mills employed in preparing and forcing clay into and through dies for the purpose of forming it into bricks, tiles, tubes, or other forms. Also employing the direct action of the elastic force of steam for the above purpose, acting alternately on both sides of a piston.

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 23.—N° 2715.

ANDERSON, George.—"Improvements in purifying sewers, "and buildings or other places, of noxious vapours."

The "noxious vapours" are drawn from the sewers or other places by means of a centrifugal fan or otherwise, and projected into a receiver containing some disinfecting or deodorising substance, as lime or peroxide of iron, &c.

[Printed, 4*d*. No Drawings.]

1855.

A.D. 1855, January 11.—N° 71.

NORTON, John.—Application and use of hard balls or spheres of clay in the formation of a permeable stratum or line of watercourse for the purpose of carrying off the water from land. The clay is worked up and moulded by the aid of suitable machinery into spherical balls, which, when dried, are burned to a crystalline hardness. The size must be varied to suit circumstances, but a diameter of four or five inches is the average size preferred. Such balls, when laid in drain cuts in the soil, allow the surface water to descend and pass freely between them.

[Printed, 8*d*. Drawing.]

A.D. 1855, January 19.—N° 149.

HILL, Thomas Coëndoz.—Shaping the ends of drain pipes and tiles in such manner that when two or more pipes are laid together they will form a good secure joint, and at the same time admit of any pipe or pipes being readily removed, and one or more new pipes substituted. These advantages are said to be secured by forming or cutting off the ends of the pipe at an angle, by preference, of 45° or at any other angle than a right angle. When two lengths of pipe so formed are laid together they produce a scarf joint.

[Printed, 6*d.* Drawing.]

A.D. 1855, February 16.—Nº 350.

PERCY, William Carter Stafford, and CRAVEN, William.—Manufacture of bricks, tiles, pipes, &c. 1. Using steam in tempering clay or similar plastic material.

2. Combining the operations of pugging and screening or separating stones, roots, &c., from clay.

3. Propelling plastic materials by rollers through a chamber into mould boxes, which are alternately brought opposite the mouth of the chamber (to be filled) and taken away again by a reciprocating action; also compressing the material in the moulds and delivering the moulded materials by pistons, fitting in the bottom of the mould boxes.

4. Drying articles moulded from the plastic materials by the action of a current of air, produced by mechanical means.

5. Relates to machines in which pistons are used for forcing clay through moulding or screening orifices, and consists in arranging the chamber or box (in which the clay is placed to be acted on by the piston) so that it will move horizontally on slides or guides; also, in combining two chambers or boxes, so that they will move on slides or guides.

6. Diminishing the frictional or adhesive force of clay or plastic material on the sides of boxes or chambers by lubricating or keeping the sides of such chambers wet.

7. Manufacturing hollow bricks, tiles, and similar hollow articles, by first moulding the material to nearly the external shape and dimensions of the article required, and when partially dry, subjecting it to pressure by means of dies and moulds, in order to complete the article; also, pressing hollow moulded articles by means of dies and moulds, to give additional shapes to them, such as forming collars or sockets on pipes, tiles, and other articles of like nature.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1855, March 2.—Nº 458.

LEWIS, James.—(*Letters Patent void for want of Final Specification.*)—"Improvements in stench trap."

"The stench traps are composed of three separate parts or "castings, namely, the box grating, a moveable pan, and a "counterbalance weight. In the bottom of the box grating I "suspend upon pivots or otherwise a movable pan, having a "projecting lever, on the outer end of which I place a counter-"balance weight, so adjusted as to keep the pan when full of "water in a horizontal position, by which means the lower "orifice of the box grating is effectually trapped, and the "escape of smells prevented. When a sudden rush of water "or other deposit enters the grating, the pan is tilted and its "contents emptied into the sewer. When emptied, the "counterbalance weight brings the pan back into its original "horizontal position, and the orifice of the box grating is "again trapped."

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 9.—N° 533.

HILL, Thomas.—(*Provisional protection only.*)—Machinery to be applied between the pug mill and the moulds used for making bricks, drain pipes, tiles, &c. It consists of a frame, composed of two sides and a curved bottom plate, with bearings in the side plates for the axis of a wheel or drum. This drum has four equidistant slots, the two slots of each pair being exactly opposite each other; and through these slots work four plungers, each pair being connected inside the drum by right and left-handed screws, so that the distance they are to protrude may be regulated. One end of the frame receives clay from a pug mill or other suitable source, and, as the drum rotates, the plungers carry forward the clay and deliver it at the other side of the frame into a box, to which the moulds or dies are fitted.

[Printed, 4*d*. No Drawings.]

A.D. 1855, May 12.—N° 1069.

SANDERS, Frederick George. — In those machines for making bricks, pipes, and tiles, in which the clay is forced through a mould or die by a pair of screws fitted in a horizontal trough, considerable strain is thrown upon one end of the machine, tending to draw the parts asunder. The object of the invention is to obviate this serious defect, by equalizing the force exerted upon each end of the machine in the following manner :—In a suitable trough for receiving the clay the patentee places two pairs of screws, the separate pairs being situated at opposite ends of the trough, and the threads thereof inclining in opposite directions; so that when the screws are caused to rotate they will force the clay from each end towards the centre of the trough, whence it passes out laterally through moulds or dies, and is received by endless bands. Knives may be substituted for the screw threads, for the purpose of mixing and forcing the clay through the dies, or for performing the process of pugging.

[Printed, 8*d*. Drawings.]

A.D. 1855, May 12.—N° 1076.

FONTAINEMOREAU, PETER ARMAND, le Comte de.—(*A communication.*)—Machine for boring or perforating stone and like materials in order to make pipes for conducting air, gas, and water, or for drainage and other purposes. The pieces of stone to be bored are fixed in separate frames or cases, capable of sliding vertically in outer cases, to which rotary movement is communicated; and each piece of stone rests on a fixed steel drill or tool, whereby the boring is effected,—the weight of the stone resting on the drill assisting the boring operation.

[Printed, 6*d*. Drawing.]

A.D. 1855, June, 23.—N° 1443.

PEARCE, WILLIAM.—Relates to machinery for manufacturing pipes, tiles, hollow bricks, and like articles. In the ordinary machines the core of the die or mould is held in its place by cross bars or rods, secured to the upper part of the mould, whereby the clay is divided in its descent; and, although it is united by the pressure it undergoes in passing through the mould, the goods or articles are generally defective. Now this invention consists in supporting the core by a central shaft, so as not to interfere with the passage of the clay through the mould.

[Printed, 8*d*. Drawing.]

A.D. 1855, June 27.—N° 1470.

MARGUERITTE, LOUIS JOSEPH FRÉDÉRIC.—Improvements *in the* manufacture of glass and crystal. The object of this invention is to manufacture silicates of potash and of soda directly with chlorides of potassium and of sodium, thus avoiding the use of carbonates of potash and of soda. The patentee claims "calcining chlorides of sodium and of potassium with a "silicate, the elements of which are capable of forming a "volatile chloride, and by using any sort of clay; not limiting, "however, the application of my process only to manufactur-"ing glass and crystal, but also applying it to fine and common "crockery, draining pipes, &c."

[Printed, 4*d*. No Drawings.]

A.D. 1855, July 2.—N° 1494.

TOOTH, William Henry.—Making a series of holes in bricks and sewer blocks, by means of a single core of various shapes in conjunction with a conical die.

Using flat knives arranged to produce the effect of a screw, by setting them in horizontal rows and parallel to each other on the pug mill or other shaft, so as to dispense with the plunger or piston mentioned in the Specification of former Letters Patent, (N° 12,465,) for making drain pipes.

Forming sewer blocks with rabbets or grooves and projections.

Making tiles of clay, glass, or other material, with grooves and ribs on the under side; and forming openings in clay tiles to receive squares of glass.

Improvement in the mode of preparing plastic materials described under the third head of former Specification, consisting in the application of a pump to exhaust the air beneath the sieve.

Improvements in making chimney-piece jambs of clay and glass; also applying an iron shoe or guard to the bottom of the same.

New method of building kilns.

Forming the backs and sides of stove grates of fine clay, glazed to reflect the heat, in conjunction with a vessel to hold the fire, resembling a goblet or other desirable shape.

Making waterclosets, as set forth in the former Specification, by forcing the clay into moulds with pressure instead of moulding them by hand, and using rubbers to grind the parts and make them air-tight.

[Printed, 8*d*. Drawing.]

A.D. 1855, July 4.—N° 1504.

HIDE, Charles.—(*Provisional protection only.*)—Connecting earthenware pipes.

The invention consists in an improved coupling for pipes. It is made "in two parts; the lower part has a broad flat "bottom to afford a firm basis for the pipes to rest upon, by "which they will be much less liable to derangement or fracture than heretofore. The upper part of the coupling rests "upon the lower, and around the inside of the two parts an "annular recess is made, communicating with an aperture in "the top of the coupling. The ends of two adjoining pipes "are laid in the lower part of the coupling; the edges of the "pipes being placed over the centre of the annular recess, the "upper part of the coupling is put in its place, and some "liquid cement poured into the aperture, which flows round "the recess, uniting the whole finally together. Branch pipes "may be as easily inserted between the couplings as the "ordinary lengths of straight pipe."

[Printed, 4*d*. No Drawings.]

A.D. 1855, July 11.—N° 1556.

WILLIAMS, William.—Making socket pipes of clay by causing a mould of the form of the interior of the socket to be pressed up against the button of the die plate when the piston begins to express the clay; so that the pipe, as it leaves the die plate, comes against this mould, and is expanded to the form of the interior of the socket, while at the same time the exterior form of the socket is produced by a projecting portion of the die plate.

Also, giving motion to the pistons of brick, pipe, and tile machines by means of a cam or excentric on the main axis, which acts on rollers or trucks on the back of the pistons.

[Printed, 6*d*. Drawings.]

A.D. 1855, July 17.—N° 1600.

PIDDING, William.—1. Manufacturing building materials by cementing together pieces of coke, pumice-stone, stone, porcelain, stoneware, glass, shells, bones, sand, and earthy or metallic matters with silicious cement, pressing in moulds, *drying in* the open air, and afterwards subjecting to a gradual heating process in an oven,—the heat not exceeding that of boiling water. The coke may be used alone or in combination with any or all of the other substances.

2. Relates to pipes to be used for carrying off rain water or for drainage or other purposes, made of lengths of slate, glass, metal, or other material. The improvement consists in luting, filling, or cementing the edges and ends of the several portions or pieces with caoutchouc, gutta percha, or a combination of both;—the ends of the pipes being connected in the same manner as wood or metal piping.

3. Manufacturing building materials by compressing in moulds, after they are coated with papier maché pulp, the following substances, either separately or combined, and cemented together (when desired) by any suitable cement:—Coke, peat (charred or otherwise), wood, charcoal, pumice-stone, cinders. When the materials have been compressed, they are baked in an oven or otherwise dried. Or peat, alone or in combination with the above-named materials, may be compressed in moulds and then carbonized.

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 16.—N° 1863.

MONK, SAMUEL.—(*Provisional protection only.*)—Bricks for draining, sewering, &c.

The improvements consist in so forming the bricks "that "they shall lap or fit one in the other at the sides or ends, and "which fitting may consist of rabeting or lapping one part on "the other, or angle grooving, or by sunken cavities and "corresponding raised parts, so disposed on the brick that "they may tie in one with the other lengthways as well as "sideway. This form of brick would be particularly adapted "for sewerage purposes, as they could be put together in a "self-sustaining arch, and finished by grouting or cementing "on the top."

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 24.—N° 1920.

EFFERTZ, PETER.—(*Provisional protection only.*)—Machinery for making bricks, tiles, pipes, and similar articles, consisting of two "square cylinders," placed side by side, and each furnished with a piston. On each cylinder is fitted a cover; between which cover and the top of the cylinder a space is left for the introduction of a mould; and over the cover is suspended a frame with knives or breakers therein. The clay or other plastic material, after passing through the breaking frame, is fed into the moulds at the top of the cylinders from buckets mounted upon an endless chain; and then, by the ascent of the pistons, the clay is compressed in the moulds, and caused to assume the desired shape.

[Printed, *4d.* No Drawings.]

A.D. 1855, August 24.—Nº 1921.

SCHLICKEYSEN, C.—1. Apparatus for manufacturing pipes, bricks, and tiles by means of a pug mill with a cylindrical case expanding upwards, the central shaft whereof is fitted with radial knives of such shape, and arranged helically around the shaft in such manner that the last quarter of one blade will cover the first quarter of the following one,—the object being to obtain a downward pressure equal to that exerted by a solid piston, in order to press the clay downwards. At the bottom of the case a cylindrical vessel is keyed on the shaft, so as to form a false bottom to the mill and receive the downward pressure of the clay. The action of this revolving vessel will be to force a portion of clay upwards, and effect its discharge at a lateral opening in the lower part of the case covered by the mould plate, while at the same time another portion is being brought opposite the opening by the action of the rotating knives. To disengage the clay from the upper part of the case, a scraper or knife, carried by the central shaft, projects upwards, and continually describes a vertical circular cut. The inside of the case is fitted with radial arms, between which the helically-arranged knives work when forcing down the clay.

2. Modification of the apparatus to be applied to the washing of earths.

[Printed, *8d.* Drawing.]

A.D. 1855, November 7.—Nº 2496.

COTSELL, George.—"An improved gutter and kerb for "roads and streets."

The improved kerb consists of a hollow box or pipe of cast iron, with a lateral grating or series of apertures for the admission of the water from surface drainage. This hollow kerb communicates with the sewers here and there by means of trapped apertures. Cross drains from alleys, &c. may be brought into it, and it may be provided with doors at the top to facilitate cleaning, and it may have gratings through which refuse water may be poured. Thus the accumulation of water in open gutters may be done away with and the consequent annoyance of splashing by vehicles.

[Printed, 10*d.* Drawing.]

A.D. 1855, December 10.—N° 2788.

JENNINGS, Josiah George.—Connecting earthenware rain pipes, &c.

"For the purpose of connecting earthenware pipes for " conducting off rain water from buildings" a "cast iron " sockets or junctions of a peculiar form are used. Each socket " or junction is cast with an internal rib or projection of the " thickness of the earthenware pipes which are to be fixed into " it, and on the outside there is a lug or lugs to fix the junction " or socket to a wall." "The junction or socket is fixed to " the end of an earthenware pipe in the following manner:— " There is a groove around and near the end of the pipe, so " that when the end is introduced into the socket, and melted " asphalte or cement is run into the socket between it and the " pipe, there will be a good joint formed. In fixing the end " of another pipe into the socket, a flexible washer or ring of " vulcanized india-rubber is placed on the projection in the " socket, and the whole of the surfaces are coated with red lead " or suitable cement, and then the end of the other earthen" ware pipe is introduced and a sound joint made."

[Printed, 10*d.* Drawings.]

1856.

A.D. 1856, January 1.—N° 6.

COCHRANE, Alexander.—(*Provisional protection only.*) —Conveying and collecting sewage, &c.

"The object of this invention is to convey water or sewage "along pipes having holes or slots formed at given intervals, "whereby the water or sewage as it passes along said pipes "may be deposited in tanks or other convenient receptacles "placed for its reception." In forcing the water or sewage along the pipe, it is proposed to carry with it, the mud, &c. from the streets, "when they are first swept, or conveyed into "receptacles, and then pressed into the aforesaid pipes through "holes or slots formed therein for that purpose." It is also proposed to provide, "by branch pipes" a water supply for houses "by conveying" the water "along the aforesaid pipes "with the sewage, as above stated; the quality of the water "to be varied, according to the purpose for which it is re"quired, by compelling the same to pass through chambers "or vessels containing ingredients for effecting that object."

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 3.—Nº 28.

MARSDEN, CHARLES.—Ventilating sewers, tunnels, mines, &c.

The ventilation is produced by "leading tubes, which may "be of different lengths, and of diameters increasing with "their lengths, into a sewer or other place to be ventilated, "which tubes open into various parts thereof, and at their "other ends lead either directly or through other tubes into "a main shaft, having an exit in the air, and provided with a "fan or other contrivance for producing a partial vacuum," by which means the vitiated air is withdrawn through the tubes into the shaft, and thence into the outer air.

In ventilating sewers it is necessary to "stop off or trap all "the gratings in the cross sewers or drains except the two farthest removed from the main sewer," and those in the main sewer are similarly closed. The pipes are conveyed along the crown of the sewers. Mines are similarly ventilated, and the system is pointed out as applicable to the proposed sub-channel tunnel. The conducting pipes are made of metal or of gutta percha strengthened or not with metal collars, or of zinc lined and coated with gutta percha. A cowl or shield may be erected at the top or other part of the shaft to shelter the fan in high winds.

[Printed, 8d. Drawings.]

A.D. 1856, January 4.—N° 33.

GREY, Robert.—Moulding "bricks, tiles, drain pipes," &c.

The machinery consists of a vertical "pug mill fitted with "an archimedian screw, and furnished at the sides, at or near "the bottom with one or more lateral orifices, each fitted with "a suitable moulding die. In front of these orifices is a "traversing platform running on wheels" to receive the pipes as they are forced out through the dies. "This platform and "orifice are so disposed with regard to the centre of the pug "mill, that the longitudinal centre line of the platform and "orifice will not form a radiating line from the centre of the "pug mill shaft, but approaches nearer to a tangent from "the circumference of such shaft." By this arrangement "the "sides and angles of the stream of clay exuding through the "orifice are rendered sharp and smooth."

"A stop piece or barrier is fitted to each platform to stop "the motion of the clay." "The clay on arriving at this "barrier imparts a short traversing motion to the platform, "during the motion of which a number of cutting wires come "into action. These wires are fixed "in a frame sliding across "the platform" but they move with the platform also so that the clay is cut transversely at right angles. The cut lengths being then removed the platform is traversed back by a weight and pulley.

[Printed, 10*d*. Drawing.]

A.D. 1856, January 22.—N° 165.

GEDGE, John.—(*A communication from M. Blanchefort.*) —(*Provisional protection only.*)—"Bending, edging, and "soldering tin" for "guttering and tubing."

It is proposed "to employ two wooden cylinders, mounted "horizontally, the one above the other; between these cylin-"ders a space the thickness of a sheet of tin is left to allow "of its being arched on one of the cylinders, and partly "embedded therein is a band of sheet iron, presenting a "curvature between it and the cylinder, so that the edge of "the sheet of tin can slide under it the whole of its length; "these being in position, the cylinder is turned by a handle "the tin rolls on, and its edge takes the form of the curved "iron. To solder this sheet it is proposed to slide a wooden

" mandril between an iron rule and the cylinder; the iron " rule serves to press the tin against the mandril by means " of a ring to be passed over the end of the rule which is " bevilled. In this manner the two edges to be soldered are " easily nipped or pressed together, and the soldering is " easily effected. To form the roll" "on the tin used for " gutters," it is proposed "to fix on a plank pins (having eyes " thereon) at 3 ft. 3 in. distance from each other; these serve " to support an iron rod, grooved in its whole length, so as " to allow the edge of a sheet of tin to enter a sufficient depth " in its entire length; between the two pins is to be fixed a " plate of sheet iron much bent in its lower edge. The two " pins are to be driven sufficiently into the plank so as to " allow only space between the rod and the sheet iron for " a sheet of tin. A sheet of tin being presented to the rod, " and its edge inserted into one of the grooves, is bent over " the iron, and finding itself stopped by the curvature of the " iron, is forced to roll over the rod which is to be withdrawn " after one turn and so the roll" is formed.

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 31.—N° 266.

KERSEY, Frederick.—(*Provisional protection only.*)—Drain pipes.

" Each length of drain pipe is formed with two half sockets, " one at each end and on the same side of the pipe, by which " when laying down a drain the alternate pipes will have their " half sockets downwards on the bottom of the trench, and " the other alternate pipes will have their half sockets up-" wards, by which means the pipes may be taken up without " breakage, and each pipe will have more uniform bearing at " its two ends than when each pipe is made with a half or a " whole socket only at one end. Such pipes may, as hereto-" fore, be made with junctions with half sockets."

[Printed, 4*d*. No Drawings.]

A.D. 1856, February 14.—N° 380.

MACFARLANE, Walter.—Constructing metal fittings, &c.

Part of these improvements relates to forming moveable details in various cast-iron articles, "by first casting the move-

" able detail separately and then placing it in position in a " second mould formed for casting the piece to which the " detail is to be connected, the working surfaces of the piece " being formed by or cast upon the working surfaces of the " moveable detail, the latter being first coated with a suitable " preparation to keep the parts free." Where cast-iron articles are composed of two or more parts required to fit or work upon each other, one of such parts is first cast separately and is then inserted in a mould to form the surface upon which the corresponding surface of the other part is cast. The plugs, valves, and gratings of sinks are capable of being cast in this way.

The inventor also describes a method of casting rain-water pipes with a branch. The branch pattern, with its core inside it, is placed in the mould, and the pattern for the outside of the pipe is laid upon it horizontally. Then after removing the pipe pattern, the branch pattern is withdrawn, leaving the branch core; this branch core is then made up to meet the pipe core and in the latter, a curved bearing plate is set, to prevent the core from being floated up by the molten metal, this plate bearing against the guage nails in the mould.

[Printed, 1*s*. Drawings.]

A.D. 1856, February 25.—N° 476.

KERSEY, FREDERICK.—Drain pipes.

" The object of this invention is the constructing earthen- " ware pipes, so as to give additional facility for correctly " laying such pipes and for opening them in case of stoppage." While an ordinary socket pipe is in the green state, the socket and part of the plain pipe, or it may be the plain end of the pipe, are divided longitudinally by a cutting wire, and thence by a transverse cut the portion is separated. When the drain is laid, this portion serves as a lid or cover, which can be removed when desired, or pieces of similar forms may be otherwise moulded or formed.

Pipes thus constructed are laid at intervals in a drain of ordinary socket pipes, so that by removing the lids above described the state of the drain may be ascertained or a damaged pipe be removed.

[Printed, 6*d*. Drawing.]

A.D. 1856, March 7.—N° 570.

DOWNIE, John.—Moulding apparatus.

This invention relates to a system of moulding, such articles as "cast-iron socket pipes, rain-water conducting pipes, "drainage or sewer tubes in clay or other materials," &c., wherein the pattern has motion given to it during moulding, "so as to effect the finishing of the moulded surface by "mechanical means.

The pattern is mounted horizontally beneath a slot in the ramming plate, and its bearings are excentric, so that by revolving the pattern it rises a semi-diameter through the slot and on further revolving falls below it. Thus after the sand is rammed on the pattern, the latter, being revolved, will come away from the mould and at the same time "sleek" or finish its surface. The two halves of a mould thus made are then put together, finished with a core and the casting completed.

Modifications of this system of moulding for other purposes are shown.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1856, March 15.—N° 628.

DUMAS, Joseph.—(*A communication from Frederick Arnaud.*)—Tiles.

This invention consists in so constructing the tiles that they may form continuous gutters for carrying off any water that may penetrate through any of the joints of the upper tiles, forming the surface of the roof or pavement.

The tiles are longitudinal troughs without ends and having a rib down the centre somewhat higher than the sides. This central rib is rebated on each side to receive the covering tiles. When two rows of these trough or gutter tiles are laid side by side the flat covering tile is laid upon them in such a way that half of the flat tile covers half of one trough, the other half covering the adjacent half of the next trough. Thus the tile rests in the rebates of the centre rib of the two troughs and consequently completely covers their joining. Any water that may get through the joints of the covering tiles will, of course, pass into the gutter tiles and so be drawn off.

[Printed, 8*d*. Drawing.]

A.D. 1856, May 14.—N° 1142.

GIBSON, Charles.—Machinery for making pipes, &c.

The clay is fed from a hopper or pugmill, through rollers into what is called the "moulding box." This consists of a chamber in which a reciprocating box with a central division and without ends, like the letter H is caused to work, by means of a sector and rack. At each end of the chamber is placed a die through which the clay is forced by the alternate or to-and-fro motion of the reciprocating box. Thus, as the box travels in one direction to force the clay through a die, it receives clay from the hopper into the other compartment for the next stroke to the other end. A safety valve is fitted to the moulding chamber to relieve against any excess of clay.

The machine is described as applicable to brick and tile making also.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1856, May 16.—N° 1165.

MELLOR, James.—(*Provisional protection only.*)—Grates or grids for sewers, drains, &c.

The parts of the improved grid consist, firstly, of a series of grids arranged in layers one below the other, the opening gradually becoming smaller, and the bars being placed alternately transversely for the purpose of straining the liquid; secondly, a series of broad bars below the first series, so disposed in layers "that the broad opposing surface of the bars "lie over the narrow spaces of the layer beneath," thus preventing return of effluvia; and, thirdly, a filtering bed, through which the water passes into the basin and thence into the drain or sewer, cleansed of impurities.

The whole of this arrangement "is enclosed in an inner "casing, and placed in a suitable outer casing or box. The "rim or upper part of the outer casing in which the top grid "or grate plate is placed is provided with openings or "cavities in those places which are opposite to the openings "or cavities in the top grid, for the purpose of allowing free "ingress of water, and at the lower part of the inner casing is "a slight projecting rim or edge dipping into a gutter or "channel of water formed in the bottom of the outer casing,

" and thus sealing or completing the air-tight junction of the " two cases."

The patentee also provides in street grids, "a small upright " grid placed at right angles above the larger grid and against " the edge or kerb stone of the pavement. "This smaller " grid may be adjusted upwards and downwards to suit the " height of the kerb, and also communicates with the larger " grid and sewer."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 8.—N° 1601.

YOUTMAN, WILLIAM.—Valves and plugs.

The invention consists in the application of a "shield or " guard of wood or metal, with a tongue or valve of vulcanized " india-rubber or other suitable material, to pipes, closet " holes, and other outlets for the passage of liquids and " excrements." This "shield or guard consists of a kind of " flange or cap covering the mouth of the pipe or other " orifice, such flange or cap having an opening or passage way " larger than the mouth of the pipe or other orifice, so as " to form a seat for the tongue or valve, of vulcanized " india-rubber or other suitable material against the end of " the pipe, and the tongue or valve being secured to the flange " or cap in such a manner as to admit of the passage of liquids " and excrements outwards, but to prevent the admission of " water or currents of air inwards."

[Printed, 6*d*. Drawing.]

A.D, 1856, July 12.—N° 1649.

PETRIE, WILLIAM.—Material for pipes, filters, &c.

The new material described in this Specification and expressed to be capable of being fashioned into drain pipes and other articles, consists of a mixture of sulphur and sand. The sulphur is melted and incorporated with the sand, and the mixture when in a viscous state is pressed into moulds. Water is then poured over the moulded mass, so as to sink through its pores, but to secure porosity the substance may also be cast with "a tail" beneath "into which the surplus sulphur " may settle." If the form to be cast necessitates the use of a fluid composition, which needs more sulphur, it should be cast with "a head," in which the surplus sulphur will collect.

In place of sulphur a mixture of sulphur and finely pulverized clay is used sometimes, and the addition of some resinous matter is also advocated. The substance may be made porous or non-porous.

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 25.—N° 1978.

BARRAT, Pierre Philippe Celestin and **BARRAT, Jean Baptiste.**—(*Provisional protection only.*)—Steam digging apparatus for draining, &c.

This invention relates to improvements upon the machinery patented on the part of the present inventors by J. H. Johnson on 10th May 1853 (N° 1151).

The improvements consist in the construction and arrangement of the wheels and in driving them; in arranging the axle of the fore carriage that it may follow the undulations of the ground and facilitating turning by tilting the fore carriage; in the arrangement of the digger frame; in adjusting the digger shaft, and in working the diggers by cams, toothed wheels, or by cranks; in fitting stops to regulate the back stroke of the diggers; in the arrangement of the digger cylinders; in applying the machinery for digging drains; in fitting forks or teeth for pulvering the earth; in using fixed instead of oscillating cylinders and in alterations in the gearing.

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 28.—N° 2004.

GARDISSAL, Charles Durand.—(*A communication.*)—"A "new manufacture of artificial fuel."

This new composition consists of eighty-three parts of clay, one and a half of alum, fifteen parts of detritus of coal and one-half part of nitrate of soda or potash, or nitric acid. The clay is dried and sifted and then mixed with the coal dust. It is then worked up with the solution of alum and nitrate, one part in weight of water being sufficient to render the clay plastic. The mass is then moulded into various shapes as drain pipes, bricks, &c. The moulded forms thus supply a fuel for burning themselves and others, and are removed from the oven in a perfect but porous state.

[Printed, 4*d*. No Drawings.]

A.D. 1856, September 12.—N° 2140.

ELLIOTT, John.—"An improved apparatus for containing "and supplying water, gas, and other fluids, applicable also "as a fluid meter."

The object of this invention is effected "by the use of a "flexible waterproof bag, sheet, or disk, of india-rubber, "oiled silk, or other suitable material, that the flexible bag, "sheet, or disk shall, by its own weight and the pressure of "the atmosphere, be forced to the sides of the containing "vessel, and down on the fluid or semi-fluid contents as they "leave the containing vessel, thus allowing them to be drawn "off without admission of the atmosphere."

With the addition of necessary mechanical contrivances, this apparatus is claimed as applicable to "flushing water-closets "or drains."

[Printed, 6*d*. Drawing.]

A.D. 1856, November 12.—N° 2662.

ECCLES, Joseph.—Machinery for making bricks, pipes, &c.

This invention, which relates chiefly to making perforated bricks, purports to be based on that for which a Patent was granted to James McHenery, on 20 July 1852, (No. 14,234,) and is supplemental to the present inventor's Patent, No. 2283 of 1854, which was also for making hollow bricks.

But part of this invention relates to a means of utilising the reciprocating motion of the table carrying the brick mould boxes, in forcing the clay through moulding orifices for making pipes, &c. A supplemental framing is added to the framing of the machine, to support the clay box in which works a piston to express the clay through the dies. This piston is worked through its rod by the end of the table as it advances and retires. A hand catch is fitted to the end of the piston rod by which it can be freed from the table or engaged with it when desired, and the table has also catches fitted to it for drawing back the piston on its return movement. These catches are released at the proper moment by inclined planes coming against pins projecting from the tail-pieces of the catches.

[Printed 10*d*. Drawing.]

A.D. 1856, November 13.—N° 2673.

TREEBY, THOMAS WRIGHT GARDENER.—(*Provisional protection only.*)—"Forming sewers or tunnels and gulleys to "sewers."

The patentee describes his method of working as follows:—"I commence at the lowest level by sinking a shaft or work-"ing as is usually done. . . . . As soon as this is done, I "lay down an invert made of cast iron or other material, but "if of cast iron, I have cast on the invert iron rails longitudi-"nally, and if of other material, I form them on the invert, "so as to form a railway to take away the earth. On the rails "I have a centre framed, so that as the earth is taken away "the centre can be moved forward to keep up the earth and "allow the brickwork to be proceeded with." He provides air tubes for ventilating the working, and the inclination of the tunnel or sewer serves to carry off the drainage water and to facilitate the removal of the earth by the railway. Should the sewer be made of iron, the inventor forms the pipes with longitudinal joints, as well as the common transverse joints. "The object of this is, that the pipes may be taken through "the sewer or tunnel in separate parts, and afterwards put "together."

The gulley pipes enter the sewer near the crown, instead of near the invert; by this means a regularly perpendicular fall is obtained whereby the cleansing of the trap or flap is secured. "At the bottom of the pipe that so enters," the inventor fixes "a flap or valve, hinged above the mouth of the pipe at the "back, so as to prevent it corroding. This flap and pipe may "be ground to fit, or it may be trapped, or any other plan "such as is in common use for trapping."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 1.—N° 2842.

VERTUE, GEORGE JULIUS.—Deodorizing sewage.

Lime taken while hot from the kiln is agitated with water in a tank over the sewer, or at but a short distance from it. "The lime solution is then led through pipes (regulated by "cocks or valves) into the sewers" in order to purify them.

[Printed, 4*d*. No Drawings.]

Instead of using screws, "inclines or wedges forming por-" tions of screws, may be made on suitable parts of the" pipes, "and if desired, such inclines or wedges, or the male " and female screws may be covered with tin foil or other soft " metal or alloy, which will cause them to work easier than if " the naked clay, earthenware, or glass be left exposed."

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 10.—N° 85.

BRETHON, Louis Julien.—Making drain pipes, &c.

The clay is thrown into a vertical cylinder in which rotates a vertical helical blade or screw. About half way down the cylinder is a perforated plate which acts as a sieve and retains the pebbles, &c. of the clay. Attached to the vertical screw shaft is a scraper which keeps the face of the perforated plate free from any collection of stones and other refuse. The top of the shaft is fitted with antifriction rollers to take off excessive friction, and vertical trefoil-shaped plates are let in through slots in the cylinder to prevent the clay rotating with the screw. The moulding box is at the bottom of the cylinder, and from it the clay is expressed through dies on to roller platforms furnished with suitable cutting wires.

[Printed, 1*s*. Drawings.]

A.D. 1857, January 16.—N° 133.

TOWNSEND, Thomas Jackson Milnes.—Drain pipes.

"These improvements consist in cutting ordinary drain pipes " (formed by forcing clay through suitable dies in a continuous " length) into convenient lengths for use, in such manner that " the ends of each piece of pipe shall be formed into corre-" sponding indents or ledges, by which means the ends of the " pipes when laid together interlock and mutually support " each other."

"The machinery for this purpose consists, firstly, of a " bench or table, to the sides of which are fitted hollow or " grooved guide irons to determine and regulate the form of " the cut; secondly, of a frame furnished with a series of " cutting wires, which frame works vertically, horizontally, " or otherwise within the said guide irons according to the

"form which is to be given to the ends of the lengths of
"pipe."

[Printed, 6*d*. Drawing.]

A.D. 1857, February 12.—N° 413.

WILKINS, WILLIAM. — (*Provisional protection only.*) —
"Improvements in flushing apparatus."

The patentee describes his invention as follows:—

"In a chamber carried out from a cistern, or at the mouth
"of a reservoir for liquid, or in a sewer, I fit on an axis at an
"angle of about 45 degrees a valve or door, which is kept
"down, and communication between the reservoir and drain
"or sewer, shut off by means of a balance weight fixed or cast
"on the valve. On the opposite end, and that which rests
"when the passage is closed against the top of the chamber, or
"reservoir, I fit a box or chamber, one side of which is some-
"times hinged. When the water in the reservoir or chamber
"rises to the top of the valve, its weight alone, or if not, some
"of the liquid falling into the box or chamber, overcomes the
"balance weight on the opposite end of the valve, raises
"that weight up and allows the contents of the cistern or
"reservoir to be discharged. When the hinged side is used,
"then the pressure of water forces it inwards when the box has
"assumed a horizontal position, and tends to keep down that
"end of the valve to which the box is fitted. As soon as the
"liquid has been discharged the balance weight restores the
"valve to its original position and keeps the passage closed.
"When fitted in a sewer, I provide a passage under the valve,
"so that the sewer may not be entirely stopped up, and I
"provide an air passage over the top of the valve."

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 13.—N° 424.

RICHARDSON, WILLIAM.—"Improvements in the use of
"iron or any other metal by itself in combination with other
"materials for structural purposes."

For "water mains or sewers," the inventor constructs a tube of iron plates, flanged together, and made tight at the joints with india-rubber or some similar substance. If great strength be required the plates forming the upper part of the tube may be cast with a ridge along them, which ridge, when the plates are all bolted together, forms a species of girder along the top of the tube, somewhat like the back fin of a fish. The inside of the tube may be enamelled or lined with asphalte ; or within it a second tube is built up of earthenware or brickwork, and the space between the two tubes filled in with some non-conducting material. The inner tube is connected with the outer by stays. If the inner tube be made of pottery, such ware is made in segments, "grooved and bevilled, so as to fit each " other and form a circular tube."

[Printed, 1*s*. Woodcuts and Drawings.]

A.D. 1857, February 17.—Nº 458.

COWPER, Charles.—(*A communication.*)—Making drains.

The drain is made by boring or digging a series of vertical holes and then boring a horizontal hole from one vertical hole to another, by means of a boring bar or mole, worked from above the surface of the ground in various ways. After the horizontal holes have been made drain pipes are drawn in by attaching them to the boring bar ; or a plastic composition may be introduced round a mandril which is afterwards withdrawn. The holes so lined or not lined, may be baked by making a fire in one of the vertical holes or trenches and causing the flame and smoke to pass along the drain and out at a chimney erected over the next vertical hole or trench. Various kinds of tools and machines are devised for boring the earth. For making the vertical holes augurs are used, carried on frames mounted on wheels. They are worked into the ground, raised to remove the earth, and worked again until the required depth has been attained. The horizontal bar may be worked with ropes or chains, or by a rack and pinion or a chain and pinion, or by a lever with a ratchet or a sliding collar on the bar, or otherwise. The bar may also be turned on its axis to facilitate the work.

[Printed, 1*s*. Drawing.]

A.D. 1857, February 20.—Nº 497.

BROOMAN, Richard Archibald.—(*A communication.*)—(*Provisional protection only.*)—Draining and excavating machinery.

"This invention consist of improvements in and modification "of the steam digging machinery patented as a communication "tion from abroad by J. H. Johnson on 10th of May 1853." The improvements relate to the placing of the wheels and their construction, to the substitution of disengaging clutches for the chain gear, to a modification of the gearing for driving the fore-carriage wheels simultaneously with the running wheels, to the arrangement of the fore-carriage which is able to follow the undulations of the ground, to the construction of the digging apparatus, which may be moved further from or nearer to the ground without interfering with other parts of the machine, to the employment of cams and stops for working the diggers, to the "employment of two diggers or digger cylin-"ders of different lengths placed at a greater distance from "each other than the thickness of the strip of soil to be "loosened, contrived to effect a better division or loosening of "the soil," and to the similar employment of three or more diggers, to the application of the machinery to the digging of drains and canals, to the use of forks or teeth behind the driver's seat on the digger carrier, to break up the earth, to the employment of fixed instead of oscillating cylinders and to certain alterations in the gearing.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 24.—N° 546.

THORNTON, JAMES. — (*Provisional protection only.*) — Machinery for making pipes, &c.

A vertical pug mill, supported on masonry foundation is used. In the foundation is a recess for the reception of a "duplex mould table." This is so constructed that one table carrying empty moulds comes in under the clay chamber while the other table with the filled moulds is coming out. This is effected by reversing gearing like that used in planing machinery or otherwise. The mould boxes are fitted with pistons which, by coming in contact at the proper time, with an incline, rise and lift out the moulded articles.

This invention is claimed as useful in the manufacture of "various earthenware articles of the brick, tube, and tile class, "such as are used for various structural purposes and for "draining." Perforated bricks can be made by this machine.

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 2.—N° 605.

SMITH, William Henry, CADMAN, James, and CADMAN, Joseph. — (*Provisional protection only.*) — Making drain pipes, &c.

The clay is pulverised and pressed in a dry state into moulds of the required shape, the moulded pipes being afterwards fired.

The material may be used fresh from the mine or heap, and it is "sometimes burned and sometimes boiled," but nothing is said to show how these processes are applicable to pipe making.

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 4.—N° 634.

TREEBY, Thomas Wright Gardener.—(*Provisional protection only.*)—"Improvements in sewers and gulleys, and out-"fall to sewers and gulleys, and of sewage."

The invention relates, firstly, to an improvement on the Patent granted to the same inventor, numbered 2673 (1856). He now declares "that the pipes used for gulleys may be "entered (*sic*) any part of the sewer," and that he traps the gulleys "by means of the common pipe dipping into water "contained in a pan."

Secondly, to attaching caissons to rising and falling sluices, so that as the tide falls or rises, the sluices are opened or shut.

Thirdly, to an improvement in sewage syphons, whereby a cock is placed at the top, and a cock at each end, instead of the two cocks at one end. When the cocks are closed at each end water may be pumped in at the top and drive out all the air.

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 10.—N° 701.

BAYLIS, Charles.—Constructing and arranging roadways, sewers and subways.

Three tunnels or subways are constructed; the centre one serves for the sewage, the other two for the gas and water mains and the telegraph wires. Above the tunnels are lines of *rail and tram*ways, and above these again the roadway for ordinary traffic. An opening of six feet in width is left along the centre of the roadway to afford light and air to the railways. The subways are fitted with iron man-hole doors, and if desired strong glass lights. The sewage from the houses is carried across the side subways to the centre, in iron pipes. In some cases the footways may be carried on a still higher level, leaving the roadway quite clear for vehicles. In this system, the shops would have to be arranged at the first floors of existing houses, the old shops being used as warehouses or maintained.

[Printed, 6*d*. Drawing.]

A.D. 1857, March 14.—Nº 730.

OATES, JOSEPH PIMLOTT.—Making clay pipes, &c.

The clay is propelled from the hopper through the cylinder, by means of a screw shaped like an inverted cone at its upper part and cylindrical below. The pressing chamber is of greater area than the parallel portion of the screw. "The clay is " forced into this chamber by the screw in a manner some- " what similar to that in which liquids are forced into the " hydraulic press." Safety pipes are provided leading from the pressing chamber, to relieve excess of pressure, an expanding and contracting nozzle is also used for making the pipes. This nozzle is made up of four dies held together by an india-rubber band, and capable of separating radially. In making socketted pipes with this die, a length is first made with the dies contracted; the latter are then expanded and the remainder of the pipe constitutes the socket. The machinery for opening and closing the dies has not been described. "Metal " or caoutchouc tubes" are "placed in advance of the ordinary " collar dies," their object "being the production of a better " surface to the articles manufactured."

The invention further consists "in placing dies at unequal " distances on either side of the supply of clay, so that when " the die at shortest distance is separated by a valve from the " machine the stream of clay is diverted into the other die, " and when the valve is opened the said stream of clay passes " spontaneously again into the first named die."

The inventor also provides perforated bottoms to brick moulds and friction rollers for the moulds to travel over.

[Printed, 8*d*. Drawing.]

A.D. 1857, April 8.—Nº 992.

ROGERS, JASPER WHEELER.—"Improved means of and apparatus for collecting for use the excrement of towns and villages, and for facilitating the drainage of houses generally."

The inventor proposes to insert in the existing sewers "cast-iron or other air-tight pipes of any suitable capacity, and to connect them with the pipes which lead from the several houses in the route of the sewer." These pipes are led to a chamber or receptacle near the mouth of the sewer, in order that they may discharge their contents therein. The chamber is air tight, and suitable means are contrived for separating the solid and liquid portions of the sewage, and for removing the former from the chamber. When it is required to keep the mains clear, a vacuum is formed in the chamber after the communication between it and the mains has been interrupted by valves. When the valves are re-opened "the discharge of the mains will immediately take place, the pressure of air behind any obstruction causing the instant displacement of the same."

[Printed, 10*d*. Drawing.]

A.D. 1857, April 9.—Nº 997.

HARLAND, JOHN.—(*Provisional protection only.*)—Making drain pipes, &c.

The clay is placed in a travelling chamber running on friction rollers, and impelled by means of a rack and pinion or otherwise, for the purpose of forcing the body of clay against the dies or bars for shaping it. These dies or bars are fitted to the framing of the machine, and are so disposed as to admit of the chamber passing along each side of them during its forward motion. The lid of the chamber is fitted in grooves in which it is free to slide. As the chamber moves forward, the front edge of the lid comes in contact with the bars or dies, and is arrested, whilst the chamber with the clay continues to travel onwards, and forces the clay through the moulding dies. The mass of clay is therefore not required to rub against the sides of the chamber.

Perforated plates or sieves may be attached to the chamber for the purification of the clay, which process may be accomplished at the time of pressing, the coarser clay being squeezed through the dies.

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 20.—N° 1115.

TREEBY, THOMAS WRIGHT GARDENER.—(*Provisional protection only.*)—Sewage syphons.

The syphon has three valves, one at each end and one at the top. Water is pumped in at the top, the two other valves being closed, and by this means the syphon is exhausted of air. These valves are worked by floats, so that the syphon is always kept charged. The "cesspool or receiver" is made "tapering, so that all matters may be concentrated to one "spot under the syphon, which is done by having the receiver "or cesspool wide at the top and small at the bottom that "comes under the mouth of the syphon, and by placing the "receiver so as the bottom is below the sewer or inlet to the "receiver, so that the sewage will have a fall, which will" disturb the heavy matter and prevent choking.

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 21.—N° 1116.

WIMBALL, HENRY. — (*Provisional protection only.*) — Making drain pipes, &c.

A pugmill is used having two or more shafts and knives, which rotate in opposite directions. The die is placed between the shafts, and may be of ordinary construction, but the inventor prefers to use "dies with rolling sides in place of "stationary ones, such sides being composed of rollers and "covered with some porous material, such as felt." When rollers are used without the porous covering "an ordinary die "may be employed, the stationary discharge mouth of the "die serving to clear the rollers of the clay as it passes be-"tween them, the discharge mouth of the fixed die being then "placed outside the rollers."

The clay may be run on to carriages and may then be subdivided as desired.

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 20.—N° 1420.

LETHUILLIER, LAURENT.—Machinery for "moulding and "compressing articles, such as bricks, tiles, pipes made of "plastic materials, as clay, peat, &c."

The moulds form the links of an endless chain which passes horizontally under a hopper in which the material is placed; a screw apparatus works the material through an aperture in the hopper, into the moulds, which then travel under a compressing ram and a knife for removing surplus material. The bottoms of the moulds are provided by an endless band of canvas or some such material, and a sanding sieve is fitted in advance of the hopper for the purpose of dusting the empty moulds. The moulded articles are thrust from the moulds as the chain turns over an hexagonal drum at the limit of its traverse, and they are received on a web, which conducts them to the drying place. Two such machines may, if desired, be placed side by side, one hopper being sufficient for the requirements of both.

[Printed, 10*d.* Drawings.]

A.D. 1857, July 22.—Nº 2018.

DOULTON, Henry.—Earthenware drain pipes.

The dies are formed with cutters in such a manner that in making a pipe it is grooved both internally and externally, so that when burned it may readily be divided into two parts. If desired also the separation may be deferred till after the pipe is laid in the ground and access is required to it. The cuts are made radially or otherwise and so as to divide the pipe equally or not as may be desired. It is preferred to give additional thickness on the sides of the pipe where the cuts are made.

[Printed, 8*d.* Drawing.]

A.D. 1857, August 14.—Nº 2168.

LIPSCOMBE, Frederick.—Draining London.

According to the plan proposed by the present patentee, the existing sewers are only to be used for getting rid of the rain and surface water. Each district is to be separately drained to a given centre, the house drains being carefully sealed from the air and placed at a good distance underground. From these centres the sewage is to pass through iron culverts to the coast where it will empty into the sea. The sewage is caused to descend the pipes rapidly for some distance and then to pass along them in a horizontal position, the patentee claiming for this method the power of obtaining a greater velocity than if the pipes were laid in a gradual incline all the way. If no natural head can be obtained, then the sewage must be raised by pumps.

[Printed, 8*d*. Drawing.]

A.D. 1857, September 8.—N° 2345.

HOWARD, William.—(*Provisional protection only.*)—Supplying air to mines, sewers, &c.

The inventor purposes to lay a "pure air main along the "roof of some of the main passages of the mine," which main "should be provided with branch pipes and mouthpieces at "convenient distances, so arranged that the men can obtain "immediate access to them when desired, so that should any "foul air or choke damp suddenly manifest itself in the mine, "the men may instantly resort to the breathing tubes and "there remain until the foul air is cleared out."

For sewers a portable apparatus is designed, consisting "simply of a double valve mouthpiece to cover the nose and "mouth, attached to one end of any convenient length of "flexible pipe or tube, the other end of which should remain "open."

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 26.—N° 2484.

LEWIS, Joseph.—Machinery for making bricks, pipes, &c.

This invention principally relates to an invention for the manufacture of bricks patented by Messrs. Grimshaw, and Rowland, 7 Sept. 1853, (N° 2060,) the principal object being to use dry clay.

The clay is ground and then heated by a granulating or disintegrating apparatus, from which it is taken up by buckets and delivered to a hopper and thence to the moulds below. The moulds are arranged in groups of three on a table rotated by a star wheel. The table remains stationary till the moulds are full, and then a knife or blade comes in and stops the supply of clay. The table now moves round and brings the moulds under the action of plungers. These plungers are worked by three cylinders, one large and two small. The first small cylinder compresses the clay, the large cylinder completes the compression, and the third raises plungers which lift the finished articles from the moulds. The table moves on and presents the articles to the action of a sweeping chain, and during such movement the internal portion of the plungers, which are conically shaped at the top, in order to force up the clay and withdraw more easily, are allowed to fall from the the moulds, the bricks being supported on the exterior parts of the plungers until they are removed on to an endless cloth. The clay is disintegrated by being worked up by a studded disc and a series of pins.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1857, September 30.—Nº 2514.

CREEKE, Christopher Crabb.—Earthenware pipes.

For the purpose of strengthening pipes they are made fluted on the outside. An annular groove is made at each end of the tube to receive the projecting flange of a junction piece, and two contiguous pipes are held together by means of clamps or key pieces, which work in inclined grooves cut in the face or sides of the pipe.

In order to facilitate access to the pipes when laid, they are constructed "with a flange at one end, and a plain end at the " other, so as to fit into the flange of the succeeding or con- " tiguous tube." These portions of the pipe are cut away at each end for a few inches along the pipe and about one-half the diameter, "so that when two pipes are brought together " there will be an open space of some inches in length cut out " of the upper part of the tube or pipe. This open space is " subsequently to be closed with a cap or cover provided with " overlapping flanges, so that when secured in its seat by " cement or otherwise, it will form an air-tight joint."

[Printed, 8*d*. Drawing.]

A.D. 1857, October 9.—Nº 2589.

HARLAND, John.—Making pipes, &c., and preparing the clay.

The clay is placed in a box which travels horizontally on rollers and presses the clay against a set of dies attached to the framing of the machine. The purifying is accomplished by forcing the clay through a grating placed either in the lid of the box or at its ends, "so that on starting the machine the " clay will be forced through such gratings, which are made

" sufficiently fine to exclude small stones, &c. This purifying " process may be carried on simultaneously with the manu- " facture of bricks or other articles, one box being kept for " purifying and another for" brick or pipe making.

[Printed, 10*d*. Drawing.]

A.D. 1857, October 19.—N° 2672.

WIMBALL, HENRY.—Making drain pipes, &c.

A pugmill is used having two or more shafts and sets of knives rotating in opposite directions. Pug mills may also be furnished with two pugging shafts having flanged wheels attached to them, the flanges of which wheels have apertures in them. Inclined stationary knives or blades are added, the whole apparatus being used for more readily directing the clay towards the die or delivery mouth. The die may be of the ordinary construction but the inventor prefers to use dies with rolling sides covered with felt or some such material. If rollers be used without the covering, an ordinary die may be employed, the stationary discharge mouth of the die serving to clear the rollers of the clay as it passes between them, the discharge mouth of the fixed die being then placed outside the rollers.

The invention partly relates to the use of carriages for carrying brick moulds through the machine such as those described in the Specification of the present inventor's Patent of 12 December 1856, (N° 2954.)

[Printed, 10*d*. Drawing.]

A.D. 1857, October 29.—N° 2750.

PADGETT, WILLIAM.—Earthenware pipes for drains, &c., and joining pipes.

Each pipe is made with a rim or projecting rib round the outside at the ends. To make the joint, two ends are brought together and surrounded by a collar of earthenware hollowed inside to hold the clay or cement packing which seals the joint. The inside of this collar and the ends of the pipes behind the ribs are roughened to enable the packing to take better hold and in addition a band of galvanised metal is placed round the two ribs and the halves of the collar are also tied together by wire.

Drain pipes for agricultural purposes are made flat and rectangular in section instead of round, the passages being round as usual if desired. This shape is chosen with the view of saving space. Apertures are made for the passage of water into the pipe and the joints are scarfed and, not necessarily, butt jointed, but the joints may also be made as above.

Pipes should be made by screw machinery the core of the die being centrally supported; the ribs are formed in the lathe. The collars may be made in moulds, but the inventor prefers to make a thick pipe, cut it into lengths and then fashion the hollow in the lathe.

[Printed, 8*d*. Drawing.]

A.D. 1857, October 31.—Nº 2777.

COTTAM, George Hallen, and COTTAM, Henry Richard.—"Improvements in stable fittings."

"In constructing gutters wrought-iron is used, which is " rolled into the proper lengths and sizes, bent near the edges " so as to produce ledges for the covers when covers are to be " used, and then the iron is rolled into the hollow or gutter " form. When making such gutters of malleable cast iron " they are first cast in the forms desired, and then rendered " malleable in the ordinary manner. . . . . If cast, as here" tofore, of ordinary cast iron, in place of using them in such " state they are first annealed, so as to render them more " tough. In making the covers for such gutters, the narrow " plates are of wrought iron, and are rolled or formed with " one surface roughed, suitable for a horse to stand on, and " such plates or covers are perforated with numerous holes. " When making such gutter covers of malleable cast iron, " they are cast of the form desired with one rough surface and " holes through at proper intervals, and such castings are " then converted or rendered malleable in the ordinary man" ner." If common cast iron be used for the covers, they are annealed.

The stable or gutter pots and their covers are made of corresponding metal to the gutters. "The pot, when made of " wrought iron, is rivetted together at the angles, and has a " rim rivetted round its upper edge to retain the cover, which " *is* formed from a piece of iron plate of suitable size and

" thickness; it is raised or dished by hammering, ... and " is afterwards drilled or punched and made suitable by pro- " jections or otherwise, to prevent horses slipping."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, November 6.—N° 2815.

LIPSCOMBE, Frederick.—(*Provisional protection only.*) —Conveying water, &c.

The conduits for this purpose are to be laid for a short distance, with an abrupt fall and for the remainder of the distance at a level, or if necessary with another fall after an interval of level. Then the patentee elicits "a large proportion " of the hydrostatic pressure due to difference in height of " levels."

"In applying this invention for the purpose of draining bog " or marsh land," it is proposed "to form a series of recep- " tacles, into which the land water can readily flow, the " receptacles being connected together; and by means of the " invention above described, or by means of a horizontal line " of pipe or channel, the water from the whole of them may " be readily carried off."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 10.—N° 2837.

ROWCLIFFE, Thomas.—Making drain pipes, &c.

The clay is fed through crushing rollers into a pug mill where it is pugged down into the pressing chamber by means of flat arms set at a proper angle. From the chamber the clay is pressed through the dies by means of a ram which moves in a horizontal direction from side to side, a die being placed at each side. Inside the die are placed perforated rollers, to which motion is imparted by toothed gearing. A small stream of water flows through these rollers and constantly damps the clay by the water passing through the perforations. The inner angles of the die are filled in, so that the clay is not so much compressed at its extreme angles as it is at its other parts and will not crack when burned. An endless web receives the pressed clay which is then cut into lengths. The pug mill may be modified by being placed on its side.

The drawings also show an apparatus of which no descriptio is given in the Specification. It would appear to be a rotar shaper for cutting the rebates inside the ends of clay pipes.

A large part of the improvements relate to brick machinery.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1857, November 18.—N° 2893.

SALOMON-COHEN Adolphe Amboise.—Making clay pipes.

This invention consists, firstly, in the application of a doubl plate to the outside of the moulding die. This double plat is capable of opening and so enlarging the aperture throug which the clay has to pass. When closed the plate forms th orifice by which the smaller part of the pipe is shaped, it i then opened and the part subsequently moulded constitute the socket. The die is furnished with a suitable core to form the inner diameter of the pipe and socket. It resembles th frustrum of a cone, the section answering to the section of th pipe, the base to the section of the socket.

The invention, secondly, consists in the use of two aprons o endless bands for receiving the moulded articles. Thes aprons are mounted side by side on a frame which traverse before the dies, thus one apron may be in use receiving th moulded pipes, while the previous batch of pipes are being removed from the other apron and so on.

[Printed, 8*d*. Drawing.]

A.D. 1857, November 27.—N° 2958.

WRIGHT, Samuel Barlow, and GREEN, Henry Thomas.—Cutting lengths of moulded clay pipes, &c.

The cutting apparatus is driven directly from the engine o other source of power, but it is put in connection with the rollers which work the endless receiving band, in order tha the speed of the cutting instrument may be regulated by the speed of the expressed stream of clay.

The cutting apparatus itself consists of a wheel, "the ends
" of the spokes of which nearest the periphery are formed of
" wires which form the cutters for dividing the clay. The
" portion of the spokes nearest the centre are formed of
" ash or other flexible material, so that they can spring
" sideways. This wheel is placed in such a position that
" *the portions* of the spokes which consist of wires pass

"through the stream of clay when the wheel is rotated, and "the wheel is placed at such an angle across the stream of "clay that the cut of the wires through the bottom of the "stream is at right angles to that stream. Above and below "the stream of clay there are guides fixed, which cause the "wires while passing through the clay to deviate sufficiently "from the plane of the wheels to make the wires cut in a "plane at right angles to the stream of clay. When the wires "pass out of the stream of clay, the clay is supported on each "side of the wire by a frame with moveable sides, kept in "position by means of springs of sufficient strength to support "the clay during the exit of the wire," but which will give and allow the passage of stones, &c. The stream of clay, after leaving the endless band, is supported by pallets, and water is caused to percolate through perforations in order to prevent adhesion.

[Printed, 10*d*. Drawing.]

A.D. 1857, December 7.—N° 3028.

STIFF, James.—(*Provisional protection only.*)—Drain pipes.

The pipes are made thicker at the bottom where they have to bear the superincumbent weight, and they are fitted with standards or feet.

"This improved form admits of the pipe being laid in the "trench in a firmer manner than is ordinary, and of easily "ascertaining the proper fall, and of ready adjustment in case "of accident." The drawing also shows the pipe as divided longitudinally in halves, the edges being serrated.

[Printed, 6*d*. Drawing.]

A.D. 1857, December 17.—N° 3095.

TURNER, Montague John, and TURNER, Marcus William.—"The improvement of conduit pipes and tubes for "sewers, drains, conduits, gas, and other purposes." The invention consists in casting "hard block glass" into the form of the required pipes. The pipes are "lipped and grooved "at either end in the manner of screw to prevent leakage or "escape with or without cement."

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 31.—N° 3200.

LONG, James. — "Improvements in the construction of " sewers, and in the means of discharging the contents " thereof."

"This invention consists in constructing sewers partly of " brickwork and partly of metal, and in combining therewith " an iron grating or series of gratings adjoining each other, " and extending throughout the entire length of the sewers, " said grating being placed within the sewer at a suitable " distance from the bottom thereof, thus dividing the sewer " into two parts, the upper part being intended to accumulate " the solid portions of that which enters the sewer, and the " lower part the fluid portions. It is proposed to have openings made through the arched crown of the sewer, at " suitable distances asunder, for introducing scrapers, which " may be worked by machinery or by hand, for cleansing the " gratings and removing the deposits thereon from time to " time, as also for ventilation." Several forms of scrapers are described. They are all so constructed as to be inoperative except when acting in one direction. A modification of the above straining principle is described, as carried out in smaller pipes which are "more applicable for distributing " sewage over farm lands."

[Printed, 10*d*. Drawings.]

1858.

A.D. 1858, February 11.—N° 256.

BELL, Richard.—Traps for stables, sinks, &c.

The patentee thus describes his invention; it consists "in " forming in or near the bottom of the pan, sink, or urinal, " a concave vessel with a plate or division made to descend " with the same, having space between the bottom edge of " the plate, and the bottom of the vessel for the passage of " liquid. When there is any liquid in the vessel it follows " that a perfectly sealed joint or sealed trap is formed. " When fitting stable pans I form them in two main com-

" partments, all cast in one, the separation being formed " between the two by the descending plate; I use a cover to " each compartment. The liquid enters one compartment, " flows off through the trap into the other, in which the " flow outpipe is fixed. By removing one or other of the " covers, the liquid pan and the pan in which the outflow " pipe is fixed can be readily got at for the purpose of cleans-" ing or otherwise."

[Printed, 6*d*. Drawing.]

A.D. 1858, March 10.—N° 486.

GEE, John Fearne.—(*Provisional protection only.*)—Joining earthenware pipes for drains, sewers, &c.

This "invention consists in the use of lock, semicircular, " rabited joints in connecting two pipes or tubes or a series " of pipes or tubes, and which joints are protected by semi-" circular earthenware coverings at each joining whereby the " joinings are rendered close and secure," and by the use of " which peculiar joints, with their covers, any one or more " of such pipes or tubes may be removed from a connected " series thereof, and replaced without injury or disturbance " to the remainder of the series."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 20.—N° 589.

PITMAN, John Talbot. — (*A communication.*) — (*Provisional protection only.*)— Preparing and moulding clay into pipes, &c.

The crude clay is first treated by passing it between two metallic rollers revolving at unequal velocities. It is then passed through an ordinary pug mill, into a channel "whose " inner side consists of the surface of a large cylinder " revolving on a vertical axis, while the outer one is formed " of a series of small rollers, also revolving on vertical shafts " which are geared to the shaft of the large cylinder. A " series of adjustable elastic or spring guard plates subtend " the angular spaces between, and are in contact with the " small rollers, and allow the periphery of each roller to " project somewhat beyond them into the channel; this chan-" nel is protected at the top and bottom by strong plates."

this process the clay is well tempered. It is then passed rough the dies and cut into lengths by a revolving knife, nsisting of two thin blades fixed upon the extremities of a evolving arm so adapted as to pass through narrow slits in he die.

The articles so made have a firm surface and are adapted for enamelling, which is part of the claim.

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 26.—Nº 643.

DOULTON, HENRY.—Invert blocks for sewers and drains.

Instead of the usual butt jointed invert blocks, the inventor purposes to apply "a projecting lip at one end of each of such
" blocks below the upper surface, and to remove a portion of
" the partition or partitions which divide the under hollow
" part of such blocks into separate hollow channels, so as to
" form a recess to receive the lip of the next block. In
" applying these projecting lips to the blocks it is advisable
" to set them a short distance below the upper surface of the
" blocks in order to allow of the blocks being correctly laid,
" notwithstanding any slight change taking place in the form
" of the blocks during burning; this allows also of a slight
" recess being formed below the upper surface of the block to
" receive cement."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 30.—Nº 674.

STEVEN, THOMAS, REID, THOMAS, and FREW, THOMAS.—Moulding gutters, sink traps, pipes, &c.

The chief part of the invention consists in new methods of moulding pipes and preparing the cores, but part relates also to moulding gutters and articles of a bowl-like nature as traps.

The gutters are moulded by ramming up the portion of the mould for the inside of the gutter, through openings in the pattern, which openings are then closed and the other part of the mould rammed on the pattern. Or the inside of the mould may be rammed up through apertures in the under plate. The pattern can also be supported in such a way as to avoid san partings in the mould.

In moulding the other articles the outer portions of t *mould* are rammed in two half boxes adjusted upon oppos sides of a central vertical plate, which has one half of the pattern attached to each side of it. The vertical plate forms a parting surface on each half-mould, and when these are rammed, they are removed from it horizontally or nearly so, and brought together again over the core, which has previously been formed on a separate plate.

[Printed, 1s. Drawing.]

A.D. 1858, April 17.—N° 848.

JENNINGS, Josiah George.—"Improvements in the con-" struction of sewers, culverts, arches, and other similar " structures, and in the manufacture of blocks of clay, pottery, " and other similar wares suitable to be used in such con-" structions."

The structure of the sewer is made up of blocks of pottery ware built up on the usual invert blocks. These blocks are made by a die "so formed as to produce longitudinal per-" forations in the blocks and also on the upper and lower " edges of the blocks grooves of a semicircular or other form, " so arranged that when the blocks are placed the one on the " other in building the structure, the grooves come together " so as to inclose a space, and into this space" is introduced " a clay pipe, which just fits, and so prevents the possibility " of one block sliding on the other;" or sometimes the upper and lower edges of the blocks are formed with "a series of " grooves or corrugations, so that when in building the " structure the edges of two blocks come together the corru-" gations of one block enter those of the other, and lock the " two blocks together." The upper surface of the invert blocks is similarly made to lock with the bottom of the blocks. " In order to facilitate the introduction of junctions into " sewers," &c., the inventor builds in blocks, "which when " in a green state have been partially perforated or cut " through on both faces, so that when it is desired to make a " junction, the centre portion of the block may easily be " broken away, at the points where it was partially per-" forated."

[Printed, 10*d*. Drawing.]

A.D. 1858, May 12.—N° 1067.

MARK, William.—(*Provisional protection only.*)—"*Roof-" ing and other tiles.*"

Part of this invention "has reference to tiles intended to be "used in the formation of gutters, spouting, &c., and consists "in forming the body thereof hollow, or in other words, as a "double shell, with a space or cavity between the two thick-"nesses. A portion of the inner shell or thickness of material "is cut away at one end of each tile, and a corresponding "length from the outer thickness or shell at the opposite end "thereof, so that by placing a number of tiles together the "place of the portion removed from either shell of one will "be filled by the projection of the corresponding shell of "the next. The space or interval between the two shells at "the part where the ends of the tiles come together and fit "into each other, as described, is to be filled with cement, "in order thereby to form a tight and secure joint."

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 22.—N° 1154.

CLARK, William. — (*A communication from François Pallard, senior.*)—(*Provisional protection only.*)—Moulding pipes of cement.

For moulding pipes a hollow mould is used, "having a "conical part, which forms the collar or socket; in the centre "of this tube there is another tube, having a longitudinal "hinge which forms a core. In order to remove the pipe "from the mould, the movable axis is removed from the "hinges, which allows of the core being withdrawn; the pipe "is then taken out of the exterior mould all in one piece."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 24.—N° 1427.

ROBINSON, Joseph. — (*Provisional protection only.*) — Adapting and ventilating ships' waterclosets.

This invention relates to the construction of what may be called a ship's sewer. "The pipe from each closet is connected "to a main sewer pipe, connected to a powerful exhausting "pump, worked either by hand, steam power, or other suit-"able means, so as always to maintain a partial exhaustion of "the sewer pipe or pipes, and thereby cleanse the closets, "*ventilate* the ship, and insure its safety, from the fact of "*there being* but one outlet for any number of waterclosets."

[*Printed, 4d.* No Drawings.]

A.D. 1858, June 26.—N° 1444.

MANNING, James Alexander. — (*Provisional protection only.*)—Intercepting and treating the sewage of London and like places.

The mouth of each sewer or group of sewers emptying into the Thames is to be connected, by means of a closed tubular drain or pipe, with a building erected at low-water mark, and containing two tanks of sufficient capacity to receive the flow from the sewer for one or more houses. The end of the connecting drain is forked and fitted with valves, so that when one tank is filled the flow of sewage may be diverted into the other tank. Meanwhile the sewage in the filled tank is to be treated and deodorised in the manner described by the inventor in the Specification of his Patent dated 7th August 1855, (N° 1786,) or by any similar method.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 28.—N° 1460.

YOUNG, Benjamin, and BROWN, Peter.—Collecting and disposing of the sewage of towns.

The system proposed by the patentees is intended more particularly to apply to London. It consists in constructing a main sewer of brick or iron along the bank of the river, in an embankment or otherwise. This sewer is to receive the contents of all the other sewers and drains, and to conduct the sewage into large tanks placed at a distance from the town. The sewage is to be allowed to settle in the tanks, the gases being drawn off and passed through furnaces and shafts. After some days the supernatant water is to be run off into the river or sea, and the solid matter accumulated may be usefully applied. The exhaustion of the gases will, it is maintained, cause a complete ventilation of the sewers.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 29.—N° 1467.

BAKER, William.—(*Provisional protection only.*)—Sewers for river banks.

Piles are driven in the bank of the river and upon them is constructed a sewage way of iron plates, the roof being supported by a central row of pillars, if the sewage way be required to be large. One edge of the covering plate rests on the bank, the other on the plate sides of the sewer. Overflow and other doors may be provided to admit water from the river at high tide, if desired. The ends of the several sewers along the banks enter the covered way. Provision is to be made for passing canals, docks, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 30.—Nº 1469.

BARRAT, Pierre Philippe Celestin, and BARRAT, Jean Baptiste.—Agricultural machine for various purposes, among others for cutting drains, and excavating.

A single cylinder locomotive engine is fitted with an intermediate shaft from which it is driven and the tools worked, and the machinery is so contrived, by the employment of cranks keyed at right angles or other mechanical devices, that the tools perform their work in two strokes or intervals, or twice or oftener on any particular spot as desired. The tools are carried by a short frame which is fitted with screws and bevil wheels for raising and lowering the tools from and towards the ground. Apparatus may also be added to the frame, by which the earth thrown up by the spades may be turned over. The implements themselves may be arranged in a great variety of ways. They may be contrived to cut into the soil consecutively and at different intervals, and thereby divide the earth into two or more layers. For opening trenches a tool is used consisting of a curved or concave rod ending in a pick, the inclined edges of which form two sides of a triangle, while the prongs carry two plates meeting at an angle, forming a shovel. Jointed or hinged tools may be used to allow of resilience on the shanks. A curved tray may receive the earth, the tray being supported by the tool driving shaft and trailing on the ground, but kept from tilting up by springs. Or an endless web may be used, The implements are also driven in various ways and for various purposes. Horse power may be used instead of steam, by applying traction to the propelling wheels and thereby actuating the driving shaft and thence the tools.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1858, July 3.—N° 1499.

CHISHOLM, John.—Deodorising sewers and sewage.

This invention consists in the application of electricity for the above purpose. The noxious properties are to be destroyed by the ozone created by the passage of a current of electricity through the sewage or the gases in the sewers, or the gases themselves are to be destroyed by combustion. For the former purpose metallic plates are sunk in the sewage which acts as the exciting fluid, the current being collected by wires and passed through the gases or otherwise. The plates may be sunk in the earth if preferred. For the other purpose, metallic rods are fitted in the sewer along the roof and broken by short intervals here and there. The sparks at these breaks, caused by the passage of a current of electricity ignite the gases. Or again metallic rods may be fitted with lengths of platinum wire which becoming heated destroy the gases. The voltaic light may also be used and it is claimed that the action of one light will be very extended inasmuch as there will be a current of gases towards the light from other parts of the sewer.

This application of electricity is claimed for many disinfecting purposes.

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 3.—N° 1504.

JENNINGS, Josiah George, and LOVEGROVE, James.—“ Improvements in water-closets, and in apparatus used in “ ventilating house drains or sewers.”

The ventilating apparatus consists in a combination of an air valve with the ordinary syphon trap and outlet valve. The air valve is so balanced or constructed that it prevents any air from passing out of the sewer or drain, but opens when the pressure of the air outside the sewer or drain is in excess of the pressure within it.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1858, July 7.—N° 1519.

SMITH, William Allen.—Brick and pipe making machinery.

The machinery which is described as adapted to the manufacture of bricks is claimed to be capable of being altered to make pipes. The clay is worked from a hopper by means of rollers, through apertures or channels into moulds fitted in a reciprocating sliding frame. The frame is then caused to traverse, by which movement the filled moulds are brought under corresponding pistons which force out the bricks on to pallet boards for removal. The same movement of the frame brings another set of empty moulds to be filled and so on. The pistons are covered with flannel or some such material.

By another arrangement the moulds are united to form an endless band which passes round two polygon wheels, the moulds running on railways. Each mould is fitted with a piston or sliding bottom. As the moulds pass along the channels in the hoppers, they are filled with clay, the pistons pressing upwards while the moulds are in the channel. As the moulds pass the polygon wheel they are turned upside down, and then the pistons, acted on by an incline, force out the bricks on to a platform travelling beneath the moulds.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1858, July 8.—N° 1540.

CRICKMER, Richard Jex.—(*Provisional protection only.*)—Sewering London and neighbourhood.

All the sewer outlets into the Thames are to be closed and below the sewers, at convenient places, are to be formed pits by which the solid parts of the sewage are to be intercepted. Beyond the pits horizontal filters may be provided for the further clarification of the sewage, which is then passed downwards into the water bearing strata through a shaft tubbed for some distance to keep out the surface waters. Pebbles or other filtering media may also be placed in this shaft and sluices are fitted in the tubbing for the purpose of allowing the ingress of the surface water when it may be necessary to cleanse or scour the shaft.

[Printed, 4*d.* No Drawings.]

A.D. 1858, July 8.—N° 1541.

FANE, Robert George Cecil.—Intercepting the solid part of sewage.

Intercepting wells are placed at intervals in sewers and drains. In them are placed cages into which the sewage pours, the cages serving to collect the solid matter. A stop bridge is constructed at the further side of the well and beneath it is a passage upwards from the well into the sewer. The sewage, after passing through the cage, passes up into the sewer again through the opening under the bridge, and may be treated with some purifying agent in its course if desired. The solid matters are lifted out of the sewer in the cage, but before lifting the cage completely out of the sewer it is desirable to allow it to drain, by resting it on ledges or gratings provided for the purpose in the manhole shaft.

[Printed, 6*d*. Drawing.]

A.D. 1858, July 10.—N° 1557.

BURRELL, Percy.—(*Provisional protection only.*)—"Improvements in ventilating sewers and other receptacles for sewage."

For this purpose "pipes are laid along the lines of sewers or other receptacles of sewage, by preference just above them, and at intervals connections of small diameters are made between the interior of the sewers and the pipes. The pipes are arranged in connection with suitable apparatus for withdrawing the air and gases from the pipes into the apparatus, which, by preference, consists of vessels similarly constructed to gasometers, which are moved up and down by suitable power. . . . . The gases thus withdrawn may by the apparatus be forced through water, with such chemicals therein as will arrest the valuable products in the gases, or the gases may be subjected to fire so as to decompose them."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 12.—N° 1558.

NORTHERN, William.—"The application of stoneware or earthenware, coloured or plain, to improved and original designs."

A part of this invention relates to stoneware pipes for drains, &c. One form is a double-flanged or socketed pipe at both ends "cut in half longitudinally, with various kind of grooves and tongues the length of the pipe . . . . any of which can be used, or with external side flanges. . . . . These

" grooves, with corresponding tongues or flanges, secure the " liquid in the drain, and by removing the upper half of the " pipe enables it to be examined and cleansed without dis- " turbing the continuance of the drain." In another form there are " two plain pipes with the upper half at each end " cut away to the extent of three or more inches longitudi- " nally, the lower portion of which are intended to butt " against each other. . . . . resting upon the double socketed " side flanged or tongued and grooved half pipe, thereby " forming one continuous drain, but leaving an aperture for " cleansing and examining same, which aperture is covered " by the corresponding half pipe, both of which being side " flanged, grooved, or tongued, secure the liquid in the " drain."

According to this invention also sewers may be constructed with stoneware blocks, say one for each, and two at right angles for the base and sides, "all joined together by means " of side flanges or tongues and grooves," apertures being left for the examination of the sewer.

[Printed, 8*d*. Drawing.]

A.D. 1858, July 12.—N° 1566.

TAYLOR, John.—(*Provisional protection only.*)—Blocks for constructing sewers, drains, and arches.

"Blocks of clay or brick earth or other suitable material are " produced by moulding or by expressing through moulding " dies of the following form :—The inner surface is concave, " and of a curvature corresponding with the inner curvature " of the intended structure. The sides are inclined to cor- " respond with the section of the circle or curve it is intended " to produce by a series of such blocks. The outer surface " of each moulded block is formed with a longitudinal rib, " by preference of a section agreeing with the sizes of bricks " to be used therewith." These blocks may have longitudinal passages formed through them, and if desired, be glazed. " In using such a block to produce a section of a sewer, " whether for an invert or otherwise, a mould such as is now " employed is used; one of the blocks is introduced therein, " then the mould is filled in with bricks, and cement is run in " as heretofore. By these means the number and extent of

" joints interior of a sewer or other structure will be greatly " reduced."

[Printed, *4d.* No Drawings.]

A.D. 1858, July 14.—Nº 1583.

CHAPUSOT, François, and AVRIL, Victor.—(*Provisional protection only.*)—Producing a vacuum for industrial purposes.

A sheet iron vessel, with cast-iron top and bottom, is filled with water, which is then allowed to flow out. A vacuum is thus created in the vessel which may be utilized for various purposes, such as "emptying sewers" and "ventilating " mines."

[Printed, *4d.* No Drawings.]

A.D. 1858, July 24.—Nº 1668.

MERRY, William.—(*Letters Patent void for want of Final Specification.*)—"Apparatus for preventing escape of foul " air from area, kitchen, and scullery drains of dwelling " houses, also from street, stable, and slaughter house " drains."

The apparatus is formed in two compartments. The sewage or water flows through a grating into the first compartment, and after it reaches a certain height, it flows through an opening in the partition into the next compartment. Here it falls into a basin having an orifice at the bottom, closed by a ball. The ball rises and allows the water to flow from the basin into the bottom of the compartment, whence it escapes by an orifice into the sewer. The orifice from the first compartment is further protected by a screen or curtain descending below the orifice, so that no solid floating body can pass through, nor can the sewer gases pass. The water also stands in the second compartment above the valve in the basin, so that the gas is also trapped there.

[Printed, *6d.* Drawing.]

A.D. 1858, July 26.—Nº 1683.

JONES, Edward.—A system of drainage whereby the sewage manure is collected, "and the noxious effluvia prevented from " contaminating the air."

A well is constructed in the sewer under a man-hole in the street. On each side of the well is a flood gate which completely closes the sewer. A tank rests in the well and serves to collect the solid matter of the sewage. When full the tank is raised through the man-hole and carried away. The flood gates are put into use when the tank is to be removed. A grating or strainer is fitted across the sewer below the well, so as to catch the solid matter and cause it to precipitate in the tank. The same principle is adapted to gulley and sink traps, &c., and the latter are so constructed as to prevent the passage outwards of the sewer gas.

A machine for making bricks, which bricks or blocks may be used in building sewers, is also described.

[Printed, 1*s*. No Drawings.]

A.D. 1858, July 31.—Nº 1732.

PERCY, William Carter Stafford.—(*Provisional protection only.*)—Pipe and brick machinery.

The invention consists in arranging the pugging apparatus horizontally, with an endless belt to carry the clay to the moulding machinery; in partly drying the clay as it is delivered from the pug mill by subjecting it to a current of air; in the use of rollers for pressing the clay through the moulding orifices; in an arrangement of three rollers, which, when in action, performs the duty of forcing the clay through the orifices and into a moulding chamber at the same time, two rollers being placed for the former purpose in a vertical plane, the third, for the latter purpose, being in a plane with the lower roller, and at right angles to the former plane; in arrangements of doctors or cutting-off apparatus; in making the clay cylinders of oval form for the sake of strength; in lubricating indenting plugs by causing them to pass through wet fibrous matter; in fitting hollow plugs with loose pistons which, when the plugs are being withdrawn, will allow the air to pass from the interior of the plugs and so prevent suction; in combining different materials in one moulded article; in cutting out cores by means of a tube with a wire stretched across its end in the direction of its diameter; in employing moveable moulds and cores, such being brought to a machine to be filled with material; and in combinations of the above details.

[*Printed, 4d.* No Drawings.]

A.D. 1858, August 2.—N° 1752.

GREAVES, Hugh.—Sewering and guttering.

The foot pavement consists of grids raised somewhat above the road level, the space beneath being occupied by gas and water pipes. The curb is of cast iron, in the form of a hollow channel, and pierced at its sides to receive the surface water. Tanks are sunk at a lower level to receive the more solid matters which may be carried by the water. By these arrangements the surface water is kept apart from the sewage, which it is proposed to run into suitable tanks placed at intervals along the road, and thence to pump it up into a pipe or pipes supported on columns along the roadway, the pipes being utilised as the foundation for a line of railway.

[Printed, 10*d*. Drawing.]

A.D. 1858, August 7.—N° 1803.

TAYLOR, John. — "Improvements in the manufacture of " blocks for the construction of sewers and drains."

The blocks are made by pressing clay in a mould or by forcing it through dies. The inner surface of a block is concave to suit the curvature of the sewer, and on the outer surface there is a "longitudinal rib, by preference of a section agree- " ing with the sizes of bricks to be used therewith." In constructing the sewer, "a mould such as is now employed is " used, one of the blocks is introduced therein, then the mould " is filled in with brick, and cement is run in as heretofore. . . " In place of making such blocks with ends and sides suitable " for producing butt-joints all round as heretofore, each block " is formed of two or more layers of brick, by preference of " two layers, the two layers being of like dimensions, but " arranged in such manner that the upper layer is caused to " overlap the under layer at one end, and one and at the same " time the upper layer falls short of covering the under layer " at one side and one end," thus the blocks when in their places will bond and break joint. "Similar forms of blocks " may be made by expressing clay through moulding orifices, " the sides overlapping as above explained, and when cut into " suitable lengths the ends may be so cut as to overlap." The blocks should be hollow longitudinally, and the hollow spaces filled in with concrete.

[Printed, 8*d*. Drawing.]

A.D. 1858, September 30.—N° 2184.

MONEY, Frederick John.—(*Provisional protection only.*) —"Improvements in the construction and adaptation of "sewers."

The inventor thus describes his improvement:—

"I propose to construct" sewers "with a pipe or connected "pipes laid therein throughout their entire length, so as to "afford separate channels or conduits, one for the liquid and "the other for the sewage; such internal pipes being con-"structed of metal, earthenware, or other suitable material. I "further arrange the sewage pipes that they may be connected "with dwellings by branch sewage pipes, independent of the "of the ordinary water drains leading therefrom to the main "sewer. And the main sewage, metal, or other pipes laid "within the main street sewers may have at suitable intervals "plugs or valves, to relieve them of any excessive pressure, "and may, when convenient, be laid at such levels as to "deliver their contents into barges, or otherwise, for further "removal; or, when requisite, the delivery of the sewage "may be facilitated by employing the archimedian screw, or "like mechanical means to raise it.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 2.—N° 2448.

McDOUGALL, Alexander.—(*Provisional protection only.*) —Constructing reservoirs, tanks, culverts, &c.

The invention "consists in the use of bricks or blocks, made "by combining asphalte or other bituminous matter with "sand, gravel, or other grit or suitable foreign substance." These bricks are made in "regular shapes so as to enable "them to be built up after the manner of ordinary brickwork," molten asphalt being used as cement.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 19.—N° 2628.

EASTON, James, the elder, and AMOS, Charles Edwards. —"Improved apparatus applicable to drains, sewers, and "water courses, for the purpose of removing extraneous solid "*matters* therefrom."

The invention consists in the adaptation to sewers, &c. of a
" moveable endless chain or grating provided with pins,
" points, hooks, or other analogous contrivances, whereby
" solid matters may be lifted out of the drain, and deposited
" alone."

[Printed, 8*d*. Drawing.]

A.D. 1858, December 9.—N° 2822.

ECCLES, Joseph.—Brick and pipe machinery.

The first part of this invention relates to the preparation of the clay. The clay as it comes from the bed is passed through rollers which deliver it on to a endless end belt or other device capable of conducting the clay for some distance subject to the action of hot or cold air produced by mechanical means. The clay is broken up while on the travelling belt and when it arrives at its destination it is thoroughly dried for the moulding operation.

The invention, secondly, consists in securing the cores of moulding dies, by the addition of stays to the usual means of holding the cores.

The inventor describes in his Provisional Specification a method of forming the sockets of pipes by means of rotating cutters, but he disclaims this head of his invention in his Final Specification as not new.

[Printed, 10*d*. Drawing.]

A.D. 1858, December 23.—N° 2936.

WHITELAW, John.—"Improvements in sewerage and drain-
" age apparatus."

" The trap or sewer and drain chamber is so contrived that
" the fluid matters discharged from the road or street are
" caused to flow into the receiver through a hinged grating
" into the body of the trap chamber; from this part the
" matters flow off beneath a hanging diaphragm, thence
" passing off at the other side over the top of a second dia-
" phragm, or division, and thence down to the main sewer or
" discharge duct. The diaphragm portion of the chamber is
" covered by a perforated plate of metal, on which is disposed
" a layer of charcoal, lime, gypsum, or other suitable and

" effective deodoriser, which layer again is covered in by an " adjustable top plate, level with the surface of the road or " street. The roof water from the houses or from other " elevated surfaces is conducted down into the chamber at " the part between the two diaphragms, so as to discharge the " water in the same way as the street surface water. Another " branch also from the water pipe leads into the space con- " taining the deodorising matter; this branch serves to allow " of the free escape of the gases from the chamber after " passing through the deodorising matter, so as to pass right " up the water conducting pipes to the top of the house; in " this way, so long as much rain water is discharged into the " trap chamber, the gases are carried directly off down the " drains; but when the water pipes are empty, deodorised " gases are passed off high up into the air without doing any " injury."

[Printed, 6*d*. Drawings.]

1859.

A.D. 1859, January 19.—N° 161.

CLARKE, Thomas.—"Improvements in the manufacture of " core barrels for pipes or columns used either for railway " piles or columns, or for water pipes or sewerage pipes."

"Heretofore core barrels have been constructed with one " row of hinges only, and a loose key or slide, which key or " slide has had to be removed every time a fresh casting is pro- " duced," whereas here the inventor constructs "a core barrel " with two rows of hinges and without a slide or key, but with " three stay bars, which stay bars when loosened, as can be " simply and easily done, allow the core bar to leave the " casting without impediment."

[Printed, 10*d*. Drawing.]

A.D. 1859, February 1.—N° 291.

LOAM, Michael.—Raising sewage, &c.

For this purpose a wheel is employed, having inside its *periphery* a number of buckets, the wheel being driven by a pinion which gears into teeth on the wheel. The sewage runs from the sewer into the buckets at a low level, and the sewage is then raised till the buckets are turned over, when it is emptied into an upper sewer. This sewer is made in the form of a fork, the two arms enclosing the wheel, but being sufficiently separated to allow the passage of the spokes. The solid matter may be separated previously to the lifting operation, or the sewage may be raised without treatment.

[Printed, 1*s*. Drawings.]

A.D. 1859, February 2.—N° 297.

WILKINS, Edward.—Drain tiles or pipes.

The invention consists "in forming half round drain pipes " with scolloped or vandyked openings or spaces along one or " both of their longitudinal edges, so that when laid down " upon a flat surface with their convex sides uppermost there " shall be small spaces or openings for the entrance or exit " of liquid into or from the interior or hollow space between " the concave side of such pipes and the flat surface on which " they may be laid, so as to serve either for draining or for " distributing liquid to the subsoil of land."

In the latter case to prevent the absorption by the earth of the liquid from the pipe, the sole tile is made of some width and has its edges turned up so as to form a channel. The ends of the pipes are in some cases formed with curved openings in which upright pipes may be inserted, for the purpose of supplying or drawing off liquid or admitting air.

The tiles may be made in the required shape, or two such tiles may be made by dividing a length of tube longitudinally before it is burned.

[Printed, 6*d*. Drawing and Woodcuts.]

A.D. 1859, February 14.—N° 415.

CLARKE, Alfred Button.—(*Provisional protection only.*)—Discharging sewage, &c. from lands into tidal waters, also conveying sewage, &c. across obstacles.

For the former of the above purposes, it would appear that a syphon is to be erected over the wall separating the tidal water from the land. The open legs are to be fitted with feet, "one " larger than the other," the water in the syphon when filled being balanced on both sides. The larger foot is capable of floating in the tidal water and as the tide falls it falls, and the water or sewage will then begin to flow through the syphon.

For conveying sewage &c. across watercourses, &c. an ordinary syphon would appear to be intended.

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 16.—N° 427.

COOKSON, RICHARD, and HOMER, CHARLES WILLIAM.—Brick and tube machinery and joining drain pipes.

The clay is "fed into an ordinary pug mill, or into a re-" volving hopper furnished with diagonal vanes working " within a stationary hopper; at the bottom of the revolving ' hopper are attached blades, which force the plastic material into a box, within which a piston is worked to and fro;" "at each end of the box is a die or series of dies," the rollers of which are covered with india rubber. "The piston is worked " to and fro in the box by cranks, or by racks and wheels " having teeth on a part of their circumferences only; and a " similar arrangement of racks and wheels is employed for " working the wires by which" the articles are cut.

Various modes of joining pipes are described. In one case the ends of the pipes are cut in a slanting direction and when placed together are surrounded by a collar grooved at the part where the collar comes over the opening between the tiles, consequent upon their slanting ends. Thus admission is given to water but not to earth and stones. Another method consists in making a rabitted socket or rib round the pipe a little distance from from one end, so that when a plain end and the end of a pipe having a socket are put together a collar may be put round the joint, one edge of the collar fitting into the socket. Or a plain rib or shoulder may be put round a pipe against which the collar round the joint will abut. Again, both ends of the pipes may be made with a shoulder, and the joint made by the saddle pieces.

[Printed, 10*d*. Drawing.]

A.D. 1859, March 5.—N° 584.

SAVAGE, WILLIAM PEACOCK.—Excavating machine.

This machine can be used for "raising and casting up clay " *or brick* earth for making bricks or tiles," or "in cutting

" new drains from the depth of one foot or 18 inches to 5 or 6 " feet from the surface."

"The earth or clay is raised by two sets of iron cups or " buckets on endless chains which are propelled into the " ground, and which chains of cups or buckets revolve upon " axes. The two sets of cups or buckets descend into the " land to different depths; one set is arranged to cut into and " remove the upper surface, and the other set is arranged to " cut into and raise the clay or earth from below. As the " cups or buckets become full they are raised by suitable " mechanism so as to empty themselves upon platforms, one " of which platforms is in rear of the engine or machine, and " it receives the soil or earth removed from the upper surface " of the land, and the other platforms revolve or slide on each " side of the engine or machine, so that the earth or clay, " when raised by the cups or buckets which descend more " deeply into the land, may be deposited laterally on the land, " or upon any stage or platform, or in carts."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, April 4.—N° 836.

ECCLES, Joseph.—" Improvements in machinery for making " bricks, tiles, and other articles formed of plastic materials."

This invention is not expressly extended to the manufacture of drain pipes, but it is obviously capable of being adapted to this purpose, and it, moreover forms the subject of further improvements which strictly appertain to this series of Abridgments.

The first improvement claimed by the patentee, is the use of a sliding plate or door in the top of the clay or presser chamber, which, when the pressure becomes excessive in consequence of some obstruction, opens and relieves the chamber.

The rest of the improvements consist in applications of crushing rollers to pugmills from which the clay is forced through dies. In one form of apparatus, the pugmill is horizontal, expressing the clay at one or both sides. Wipers or cams are fitted to the pugmill shaft, which in revolving with the shaft, at intervals close the dies and stop the stream of clay, thus giving time for the cutting wires to act fairly. Two pairs of rollers fitted with doctors are mounted, one pair above the other, and at varying distances apart, above the pugmill. Through these rollers the clay passes to the mill from a hopper, being crushed in the passage.

Another form shows the pugmill in a vertical position, with rollers at the top and dies at the bottom. and in yet another, form the mill is horizontal with the dies in line with the axis. With the last form the cutting wires operate upon the stream of expressed clay in motion.

[Printed, 10*d*. Drawing.]

A.D. 1859, April 23.—Nº 1027.

MAGUIRE, Frederick Colwell.—(*Provisional protection only.*)—Utilising sewage.

"This invention consists in raising by steam or other power "sewage to reservoirs of sufficient height and space for the "operations of machinery either internally or externally, to "allow such sewage to traverse the various lines of railway or "roadway in, through, or along stone, earthenware, or such "other pipes or channels as may be most convenient and "economical for the purpose required, with enclosed re-"ceptacles at the various railway stations throughout the "three kingdoms, or depôts on the various roadways, to allow "of it being carried away from such stations or depôts in "manure distributors, or taken in pipes to any farm, home-"stead, hamlet, village, or townland within the three kingdoms "aforesaid, for the purpose of irrigation and fructification, or "both."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 2.—Nº 1097.

BASFORD, John.—Dies for pipe and brick machinery.

The invention "consists in forming the bridge which carries "the core or interior die in a bent or zig-zag form, and in such "manner that the clay or plastic brick earth in place of "being cut or divided radially as heretofore, is divided in an "inclined direction, by which a lap joint is formed in the clay "as it passes through the die in place of a butt joint."

The drawing shows the application of the improvement to a pipe die.

[*Printed*, 6*d*. Drawing.]

A.D. 1859, September 21.—Nº 2146.

GEYELIN, GEORGE KENNEDY. — (*Provisional protection only.*)—Making drain and socket pipes.

The machine for this purpose, according to the inventor's own description, "consists of a single-threaded screw, of one " revolution or more, over the die box, and to obtain greater " power of feed I use either a fixed accumulator or a reversed " pug mill motion above the screw. By this construction " enormous and continuous compressing power is obtained, " and dies can be fixed on five sides of the die box. I claim " also the mode of making socket pipes without a moveable " platform, by merely using moulds which preserve the form " of the pipe in its descent."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 6.—Nº 2284.

GIBSON, GEORGE, and **GIBSON**, JAMES.—Raising and removing earth from sewers and other excavations.

A number of buckets or scoops are attached to an endless chain which passes round a polygonal drum carried on framing above, and round a similar drum at the bottom of the excavation. The scoops deliver the earth into a shoot which is reciprocated by an eccentric, so as to be clear of each scoop in its descent. From the shoot the earth passes on to an endless belt which delivers it into waggons or elsewhere. The chains may be lengthened or shortened as required and several such chains and sets of scoops may be carried by one framing, which is also capable of being moved as required, to suit the progress of the work.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1859, November 9.—Nº 2551.

DALES, JOHN.—Applying deodorizing fluids to sewers, &c.

The fluid is contained in a tank, constructed underground and near the sewer, with which it communicates by a pipe. Near the tank a shaft is built, covered with a moveable door, and in this shaft is placed a glass guage for indicating the quantity of fluid stored in the tank. Clockwork apparatus is also placed in the shaft, for the purpose of controlling a tap in the pipe communicating with the sewer, so that at certain times in the day when more than the usual quantity of sewage is known to be passing along the sewer, a larger quantity of the deodorizing fluid may be turned into the sewer.

[Printed, 6*d*. Drawing.]

A.D. 1859, November 10.—N° 2556.

TENWICK, John.—Street gutters.

The gutter is made "in the form of a deep trough," with "a curved lip at top to rest on the surface of the street or "road; into the top of the trough" is placed "a dished or "concave plate of metal, through which numerous holes are "formed." "Under ordinary circumstances the water will "pass principally through the aforesaid holes in the lid of the "gutter and along the trough below into the trap" and thence to the sewers; "but in cases of floods it will pass along both "the surface of the gutter and the trough."

The lids are placed on pieces of wood fitted in rebates in the trough to prevent jar from passing vehicles, and where the gutter is fitted with traps, the trough projects into the trap to the part just above the 'seal.' When placed in footways the lid is roughened.

[Printed, 10*d*. Drawing.]

A.D. 1859, December 5.—N° 2751.

SHORT, Charles, SMEETON, Thomas Bowes, and BOWLER, William.—Drain pipes, &c.

This invention consists in making the above and other articles of "the cinders or slags formed in the processes of "manufacturing, puddling, or refining iron." These slags are run while fluid, into iron moulds, and the resulting articles are then annealed.

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 6.—N° 2757.

COIGNET, François.—An improved beton.

This beton is claimed to be useful, among other things, in the construction of drains, conduits, culverts, sewers, supports for mine galleries, tunnels, arched ceiling for subways, "longitudinal passages being provided in the thickness to form "fluid-tight channels for gas, water, &c., instead of the tubes "now used," &c.

The chief feature in the invention is the reduction in the quantity of water required in mixing the materials of which the beton is composed. The lime, which may be used within a few hours after burning, is slacked with the least possible quantity of water. It is then reduced to a firm plastic mass, and the slacking, if not previously entirely effected, completed by grinding with a very small quantity of water by machinery. The remaining constituents of the beton, before being mixed with the lime, are dried as much as possible, and this drying, together with the use of natural or artificial puzzolanas, moderates the excess of moisture. Irregular fragments of iron and double-headed nails may also be mixed in, to serve as binding agents. The mixing and pressing is thoroughly effected by mechanical means.

The inventor also claims the employment in beton, having lime for its base, "of cements in proportions much less than " hitherto, and never exceeding $\frac{1}{10}$th part of the mass, and " sometimes not over $\frac{1}{20}$th or $\frac{1}{30}$th."

He bases his improvement on the theory that the quality of lime betons depends on the crystallization of the lime rather than on chemical combinations, and that such crystallization is brought about by dispensing with a large proportion of the water of admixture usually employed.

[Printed, 6*d*. No Drawings.]

A.D. 1859, December 20.—N° 2906.

JOHNSON, JOHN HENRY.—(*A communication from James A. Lowe.*)—Water traps.

This invention consists in a new mode of manufacturing leaden **S** bends by casting them in one piece, instead of joining bent pipes by soldering. For this purpose a special kind of core is used. It is of metal, and consists of "segments of the " bend put together separately upon a series of square blocks " joined together by links, the segments fitting into dovetails " on the external surfaces of the blocks in such a manner that " they will form a curved metal core of a round section." " A hollow cylinder is screwed on the end of the bend, on " which cylinder is shrunk a ring, which fits a shoulder in " the end of the core, and presses them against the screwed " cylinder which thus holds the core firmly. The cylinder " with the bent core screwed on is placed in the mould, and

" by drawing the other half of the core (for the reverse bend) " tightly against it, all the end joints will be closed whilst the " dovetail, if properly fitted, will hold the longitudinal joints " tight." After casting the core is withdrawn " by first " unscrewing the cylinders and removing them, then inserting " a sheet metal pipe in the trap to hold the segments of the " core in their places whilst the plugs are withdrawn by means " of a hook, leaving the segments inside, which latter are " easily removed individually."

[Printed, 6*d*. Drawing.]

1860.

A.D. 1860, January 11.—N° 73.

BROWNLIE, ARCHIBALD.—(*Provisional protection only.*)—Separating solid from liquid sewage.

The separation is performed by means of intercepting pits placed at intervals in the sewer. These pits are wider at the top than at the bottom, and are placed one after another in a a line, so that what solid matter escapes the first may fall into the second, and so on. These pits are accessible from underneath and being valved, the contents can be removed when required.

By another method filtering beds of ashes or like substances, are placed within intercepting embankments in the sewer.

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 25.—N° 187.

RAMSPACHER, THÉODORE, and SCHMIDT, CHRISTOPHE FREDERIC.—This invention consists in filling the meshes of wire gauze with metallic substances, either by immersion in the molten metal or by galvanic agency, or with gummy substances, such as india-rubber, gutta percha, marine glue, oils, resins, &c., and in combining such prepared gauze with leather or other suitable fabric for the manufacture of various articles among which, pipes and gutters are specified.

[*Printed, 4d.* No Drawings.]

A.D. 1860, January 30.—N° 232.

WALKER, THOMAS.—"Cleansing sewage water."

The sewage water is conducted into a small pool, from which it passes into a larger or settling pool. This is formed with an inclined bottom, the overflow passing off at the shallow end. The sewage water passes into the settling pool or tank at the bottom of the deepest part, and during the time elapsing between its entrance and exit, an opportunity is afforded for the subsidence of the solid matter. The use of the first tank or pool is to break the force of the current issuing from the sewer. When a quantity of solid matter is deposited, the flow is diverted into another pool, the remaining water drained off, and the solid matter removed.

[Printed, 8*d*. Drawing.]

A.D. 1860, February 1.—N° 259.

SHAW, BENJAMIN.—"Improvements in stench traps, and in " the cesspools or pits of sewers."

The stench traps are made removable from their sockets, so as to enable them to be emptied of the mud. They are of a " slightly taper figure with a flat bottom, and having a handle " immediately under the grating to lift it out by. The mouth " of the trap is provided with a flange on which the grating of " the trap fits, as in ordinary traps. An outlet is made at the " side of the trap through which the water passing through " the trap escapes to the drain; opposite the said outlet and " and inside the trap is a plate, by which the mud is prevented " from passing to the drain. The top edge of the trap is " provided with a flange, the under side of which has a wedge " shape, which fits in a groove of corresponding shape in a " fixed socket or bed in the floor where the trap is used. The " said groove in the fixed socket is filled with water, so as to " form a water joint, for the purpose of preventing the effluvia " escaping from the drain, or in addition to, or in place of " water in the groove, sand or some fibrous substance may be " used." Vessels are placed in the sewers or cesspools for the purpose of collecting the solid matter, sometimes they are placed in nests. They are emptied occasionally.

[Printed, 1*s*. Drawings.]

A.D. 1860, February 6.—N° 317.

TYE, Thomas, and ANDREW, Charles William.—Trapping sinks.

Instead of placing the trap at the top of the waste pipe and flush with the bottom of the sink, the waste pipe itself is formed with a double elbow or bend, in which bend there will remain sufficient water to close the pipe. A grid is permanently fixed in the sink at the top of the waste pipe and a screw stoppered orifice is contrived in the bend of the pipe to facilitate cleaning. By means of this orifice a force pump may be used, if required, to flush the drain.

[Printed, 10*d.* Drawing.]

A.D. 1860, February 15.—N° 410.

PERCY, William Carter Stafford.—(*Provisional protection only.*)—Machinery for making pipes, &c.

The invention consists in preparing cinder clay by forcing it by means of a piston, through a series of grids, which grids may be made with flanges or ribs equal in depth to the largest expected stones, or they may be without ribs and caused to move across the chamber, so that any stones may be carried with them as they move. Such grids may be made in the form of a circular disc or endless chain of bars. The invention also relates to a "certain combination of screws and gearing to " operate the piston or pusher, namely a shaft, worm or screw, " and worm wheel, forming a nut for the screw attached to " the piston or pusher, and combining with the first mentioned " shaft another, so that the two can be geared together by " wheels so proportioned that the speed or power (otherwise " leverage) may be" regulated as required. The chambers are made oval in form and in one piece, with suitable strengthening ribs. The "moulding orifices and cores may be " extended to form a mould box of the size of the article " required, the mode of action being to cover the orifice to " prevent the escape of clay from the box till it has become " well consolidated when the cover is removed, and it is " allowed to deliver as much of the moulded material as when " cut by the wire will form the article required." The moulding orifices may be placed in the lid of a vertical cylinder, the piston of which does not come up to the screens which are placed in it, but leaves a space for stones to collect in. India-rubber is used for packing the pistons. The invention also relates to improvements on the drying apparatus patented by the inventor and William Craven in 1855, (No. 350), and which consist in making the apparatus portable, in having several railways one above the other and in adding a stove and flues.

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 15.—N° 419.

JENNINGS, Josiah George.—Trap.

This invention relates to sanitary apparatus, such as "water-" closets, urinals and lavatories," but one part of it has reference to a trap or valve for preventing the ascent of impure air in waste pipes. This valve consists of a flap hinged or suspended in a frame which fits into a recess in the pipe, in such a manner that by disconnecting the lower part of the pipe, the valve may be got at. This flap permits the flow in the waste pipe, but will not allow the impure air to rise past it.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, February 23.—N° 492.

GILBERT, Samuel.—(*Provisional protection only.*)—"A " new machine for excavating sewers, tunnels, and other such " like underground work."

"The objects of this invention are to excavate sewers, " tunnels, and almost any kind of underground work, and at " the same time allowing the building of the required number " of rings of brickwork without the use of timber to prevent " the slip from above." The inventor says, "I propose " employing a cutting shield of the form of the upper part of " the tunnel or sewer, and supporting it by suitable framing, " upon which are powerful screw jacks, hydraulic presses, or " other suitable power, for the purpose of driving said shield " forward. The shield travels over rollers on the top of the " frame, and can be made to travel in a straight line, rise, fall, " or turn a course by means of such rollers. The bearing " prop or framing at the back of the brickwork may be formed " in the shape of an X; the lower part thereof serving as an " entrance passage to a waggon road, where such is required."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 3.—N° 587.

ECCLES, Joseph.—Brick and pipe machinery.

This invention partly relates to improvements upon the machinery patented by the inventor in the year 1859 (No. 836.) One improvement consists in the construction of the "wiper "employed in such machines." A flange is formed on both sides of it instead of only on one side, "by which means the "clay is not only prevented from escaping at the end of the "cylinder past the shaft with which the wiper rotates, but is "also concentrated and more evenly directed and expressed "through the moulding orifices than when such wipers are "formed with one flange only.

The rest of the improvements relate to brick and tile machinery.

[Printed, 10*d*. Drawing.]

A.D. 1860, March 13.—N° 665.

MANGLES, Martin.—(*Provisional protection only.*)—Disinfecting sewers.

For this and other similar purposes, the inventor makes use of chlorine, or other gases such as nitrous acid, sulphurous acid or hydrochloric acid, and forces it into the sewer through a main, perforated with holes at intervals. The pressure of steam or air is used as the propelling or diffusing power.

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 11.—N° 908.

ROGERS, Jasper Wheeler.—(*Provisional protection only.*) —Sewering towns, houses, &c.

The invention relates to improvements upon an invention patented by the inventor in 1857 (No. 992.)

An air tight main pipe is placed in the sewer. One end of this pipe terminates in an air-tight chamber into which the sewage is received and deodorised. The house sewers run into this pipe, and each sewer is fitted with a valve. The pipe is also divided into sections by valves, each section being provided with a stand pipe for adjusting a portable iron pump. Should any one house drain be obstructed, the section of the pipe to which it belongs is closed, as are also the remaining house drains in that section. If then the air be exhausted from the section the stoppage in the pipe will be removed by atmospheric pressure.

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 12.—Nº 912.

NEWBOLD, Charles. — Bituminized paper pipes, gutter troughs, &c.

These articles are made by coiling or lapping sheets or a continuous sheet of paper or other fabric, such sheets or sheet being caused previously to pass through a bath of melted bitumen. Various patterns of pipes are described, joined either by sockets, coupling pieces, or screws, the latter being made by coiling a wire of suitable section with the paper.

"For semicircular troughs or half pipes to be used either " for guttering, eaves, troughs," or other purposes, a sheet of paper is coiled round a mandril and afterwards "collapsed" " to a semicircular form, giving to the longitudinal edges the " halved, rebated, filleted, square, or rounded form, as may " be required, by pressure, the half socket being formed in " manner similar to the whole pipe, or it may be formed by " pressure applied to the end; or instead of forming half " tubes in the manner just described, they may be formed by " passing sheets of paper or other material round or over a " flat core, and afterwards bending or shaping them by " pressure."

Pure bitumen, or a bitumenous mastic prepared from the products of gas distillation, is used, and the composition may be varied to suit the circumstances to which the pipes, &c., will be subject.

Machinery for coiling the paper or other fabric is described.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, April 26.—Nº 1044.

DURAND, Jean Claude.—(*Provisional protection only.*)— "A new system of drainage for towns when affected by the " tide."

In the case of a town on a tidal river, a sewer is constructed parallel to the stream, and furnished with a gate at each end, The upper gate opens into the river above the town, the lower into the tideway some distance below the town. During the flow of the tide the lower gate is shut and the sewage accumulates in the sewer together with the water coming from the upper stream. As soon as the tide ebbs the egress door below the town is opened and all the contents of the sewer are carried into the tideway with a velocity proportional to the slope of the canal and the quantity of accumulated water.

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 9.—N° 1142.

KEMP, Henry.—Preserving iron sewage pipes.

For this purpose the following composition is applied while hot to the surfaces. Equal parts of peat tar and wood tar are mixed, the former having previously been boiled with sulphate of barytes. To the mixture is added methylated spirit, peat or linseed oil or both, in sufficient quantity to make the compound work smoothly, arsenic in the proportion of four ounces to the gallon of the combined tars, rosin three ounces, carburet of iron four ounces to the gallon, or thereabouts, and the whole ground or rubbed together.

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 23.—N° 1275.

COLLYER, Robert Hanham. — Manufacture of pipes, gutters, &c.

The material of which the above are made consists of vegetable or animal fibre, such as straw, hemp, or wool, mixed with bitumen properly tempered and used hot. Paper "half-"stuff" may also be used when mixed with bitumen.

The straw is treated under the Patents granted to the present inventor on the 29th Feb. 1860, (N° 564.) and the 28th March 1860, (N° 804.)

The material is forced from a cylinder, by means of a piston through a mouthpiece in the shape of a truncated cone, which is centrally fitted with a core. The whole apparatus, including the piston is warmed with steam, the moulded articles being cooled by a current of water.

Pipes may also be made by placing a small pipe of thin steel within a larger, and filling up the annular space with the bitumenous compound.

[*Printed*, 6*d*. No Drawings.]

A.D. 1860, June 5.—N° 1377.

JARDIN, Joseph and GIRARD, Paul Adrien. — (*Provisional protection only.*)—"Drain tiles," &c.

This invention, which is claimed to be applicable to the manufacture of drain tiles, is thus described:—"The clay "after being moulded into a rectangular form or brick "between two cylinders, is conducted by means of an inclined "plane on to a carriage placed on an endless cloth. It is "then divided longitudinally into two equal parts, each the "width of a brick, by means of a wire stretched across the "machine. Each carriage is furnished with parts at distances "equal to the length of a brick placed perpendicularly at "their front ends. These parts come in contact with the "arms of a double moveable mill or drum, and communicate "a rotatory movement to it, forcing down parallel arms "which obey this motion and thereby cut by means of a wire "with which they are supplied, the piece of clay the length "of a brick. After this operation each carriage carrying a "brick is transported right and left of the machine by means "of an endless cloth. Hoppers placed above the forming "cylinders distribute sand continuously to prevent the clay "adhering to them."

"Instead of the wire for cutting the clay," "a moveable "plate with a cutting edge" may be used. Scrapers remove any adhering clay.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 8.—N° 1418.

RICHARDSON, William.—(*Provisional protection only.*)—Joining drain pipes.

These pipes, which are "made of burnt clay, or other "earthy, vegetable or mineral matter," have flanges perforated to receive "pegs or pins of wood" which fasten the point. "A packing of felt, cement, or any other material applicable "to the purpose," is placed between the flanges.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 12.—N° 1438.

HYDE, Robert.—Draining stables.

A box or drain pot is let flush into the stable floor, and is connected with a syphon or S pipe, which forms the trap and drain pipe leading to the sewer. The box and pipe may be constructed separately or together, of iron or earthenware. A perforated plate is fitted to the top of the box, and in places where water is not laid on, or where the fall is not great, an inner and finer perforated plate may be introduced at the mouth of the syphon pipe, to prevent the entry of refuse. For facility of flushing a service pipe may be attached to the side of each of the boxes or pots, a cock being provided by which water may be turned on, and the whole series of drains flushed simultaneously.

[Printed, 6*d*. Drawing.]

A.D. 1860, June 13.—N° 1448.

SPENCE, William, — (*A communication from George E. Vanderburgh.*)—Waterproofing sewers.

This invention relates to the production of a fluid silicate, which is claimed to be useful for waterproofing sewers, by incorporating a small per-centage of some alkaline base with the silicious substance and subjecting the composition to the action of superheated steam.

The mixture of sand and soda or potash is placed in a digesting chamber, in the upper part of which it is always exposed to the direct action of the steam. The steam is admitted by a central pipe, and discharged through slotted pipes at the end of radial arms, so as to act directly on the composition as it is raised by revolving elevators.

[Printed, 8*d*. Drawing.]

A.D. 1860, June 20.—N° 1494.

WIMBALL, Henry.—Making drain pipes.

This invention relates partly to brickmaking machinery and partly to an improvement in the pug mill for which the inventor received Letters Patent in 1857 (No. 2672.)

This improvement "consists in the application of a roller " to the lower end of each of the pugging shafts" whereby he is "enabled more easily to make drain pipes, as the " clay is forced or squeezed more effectively through the " die." The inventor also proposes "to place the pugging " shafts and pug mills so near to each other that their respec- " tive knives will cross or intersect each other during their

" rotation. The stones which may be in the clay are removed " by a screening grating, and are carried round by the lower " blades to the two opposite sides of the pug mill, and may " be removed through doors made therein for that purpose."

[Printed, 10*d*. Drawing.]

A.D. 1860, June 21.—N° 1513.

BUCKWELL, William.—(*Provisional protection only.*)—Moulding pipes, &c.

Cast-iron moulds, fitted with cores are filled with cement in a moist state, consolidated by repeated blows of a steam hammer suspended from a travelling carriage. "For draining and " irrigating purposes" the blocks or pipes are hexagonal in section with a hollow centre formed by the core. A ring is used to form the bottom of the mould, and when the core is withdrawn a clutch may be lowered through the pipe, which expanding beyond the ring will sustain the pipe as it is raised from the mould. Separating plates may be inserted after given quantities of cement in order to prevent adhesion and determine the lengths of pipe.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 22.—N° 1521.

MACFARLANE, Walter.—Gutters and rain water pipes.

"There is attached to the sides of the cast-iron centre or " valley roof gutters, a bracket or other attachment for fixing " or suspending the beams or astragals of the skylight in such " a manner as the water of condensation on the inside of the " sash may drop or flow into the gutter and at the same time " provide a passage for fresh air." "The bracket may be " cast on to the gutter or otherwise attached to it without " bolts or screws."

"The invention also comprehends the application to rain " water or other pipes of a 'pedestal' at the bottom of each " stalk of pipes, the general figure of the said pedestal piece " being of a base-like shape, and larger in its diameter than " the pipes comprising the stalk, and made either square or " angularly sided, having a socket in the upper end for " receiving the spigot of the pipe. Attached to the outside of " socket there is a butt for fastening to the wall whilst at the " lower part there is a spigot end, the outside diameter of

" which is equal to the diameter of the pipe above for con-
" necting it to the drains. A door may also be fitted in front
" of the pedestal for affording access to the interior of the
" pipes."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, June 25.—N° 1544.

HIGGINBOTTOM, William.—(*Provisional protection only.*)—Joining drain and other pipes.

The joint is made, without the aid of the ordinary socket formed on the pipe itself, by means of a loose socket composed of metal or earthenware and having a cavity inside, into which is forced by hydrostatic or other pressure, a suitable cement.

The invention also relates to the construction of water valves and hydrants.

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 28.—N° 1566.

BLAKELEY, James and BLAKELEY, William Henry.—Cutting out troughing and spouting.

For this purpose a cylindrical saw is used, which is so contrived that the part cut off is preserved unbroken. The saw has teeth at one end, and is open at both ends. It rests upon and is driven by a friction pulley or drum mounted on a rotary spindle, with an adjustable friction roller placed inside to press the saw in contact with the drum. Teeth or pins project at regular distances in the surface of the drum and enter perforations in the saw. Friction rollers are applied to the sides of the saw to keep it in position.

[Printed, 10*d.* Drawing.]

A.D. 1860, July 3.—N° 1612.

DURAND, Francois.—(*Provisional protection only.*)—
Purifying the Thames and other tidal rivers."

A canal is to be constructed from the river, near the city or the drainage discharge therefrom, to the sea. It is to be fitted at each end with gates. When the tide rises the sea gates are to be kept closed, the canal being supposed to be empty. The river gates being opened, the head of sewage laden water *driven back* by the tide will flow into the canal. When the tide commences to fall, the river gates are to be closed and the sea gates opened, upon which the water in the canal will flow out to sea.

[Printed, *4d.* No Drawings.]

A.D. 1860, August 17.—Nº 1994.

NEAME, John Austin. — (*Provisional protection not allowed.*)—" Socket and other pipes."

The invention "consists of reversed action of several helices, " delivery on the incline, and otherwise." No other description is given.

[Printed, *4d.* No Drawings.

A.D. 1860, August 23.—Nº 2030.

LILLIE, Sir John Scott.—Blocks for sewers and tunnels, &c.

The inventor takes "stone, flint, broken bricks, clinkers, or " other hard material," and unites "the same by bituminous " compounds or other cements, cast in moulds of such form, " shape, or size as may be required, being rectangular for " perpendicular walls, and in segments of circles for arches, " sewers, tunnels, &c."

[Printed, *4d.* No Drawings.]

A.D. 1860, October 10.—Nº 2463.

HOBSON, Aaron and **HOBSON**, James.—(*Provisional protection only.*)—Trap for drains, &c.

" The trap is made to admit the water at the top between " two pieces running across the top but open in the centre, " which forms a part of the trap. The water then runs upon " another piece or shelf across the centre of the trap, from " thence into the drain or cesspool. The foul air is stopped " by coming in contact with the bottom shelf, which prevents " it rising any higher, and the atmospheric air having filled " the top above the last-mentioned shelf prevents the foul " air from expanding and making its way to the surface."

[Printed, *4d.* No Drawings.]

A.D. 1860, October 11.—Nº 2482.

ROGERS, Jasper Wheeler.—Means of sewering.

This invention relates to one of a similar nature for which the inventor obtained Letters Patent in 1857 (No. 992).

An air-tight trunk or second sewer is placed within the main sewer, and is made to communicate with an air-tight reservoir, into which the sewage may be received and deodorized or filtered therefrom. This trunk is divided by valves into sections, and the house drains run into these sections, each drain being similarly fitted with a valve. The main trunk is also fitted here and there with air-tight stand pipes, also valved. In case any house drain should be obstructed, the section of the main trunk appertaining to it may be cut off and exhausted through a stand pipe, the other drains leading into it being closed. The atmospheric pressure will then relieve the house drain, the valve of which is left open.

The valves described consist of chambers, each containing a disc raised or closed by means of a spur or screw working in a sector attached to it.

[Printed, 8*d*. Drawing.]

A.D. 1860, October 15.—N° 2507.

STEVENS, Charles.—(*A communication from Louis Constant Desaint.*)—Cutting out drain pipes.

These pipes are cut from stone by means of a machine in which are combined a band saw and a set of drills, worked in the usual manner by gearing. The saw cuts out the pipes of any required size and shape ; the drills perforate them. The machine works partially immersed in water, kept in agitation by the rotation of the machine.

Various patterns of drainage pipes are shown in the drawing. One is square on the outside, and pierced with round holes. Pipes of this pattern are joined by a socket. Pipes are also made with an oblique joint, and they have no socket.

[Printed, 6*d*. Drawing.]

A.D. 1860, November 3.—N° 2694.

ARMOUR, John.—Dies for drain pipes, &c.

In front of the orifice of the die, and sliding in grooves, are fitted two thin plates of steel, with their inside faces or cutting edges shaped to a half circle. When a sufficient length of pipe has been pressed out of the die, these cutting plates are brought together by means of levers, and then the length is cut off square, and the plates, by meeting tight against the *bell of the die*, prevent any further exit till they are opened.

When it is required to produce pipes that are to have a faucet on one end, the die is made with a recess outside it corresponding to the outside of the required faucet. The cutting plates are then made to act outside this recess, so that on being closed they form a space or chamber to be filled with clay corresponding to the shape of the faucet.

[Printed, 8*d*. Drawing.]

A.D. 1860, November 26.—Nº 2904.

SHARP, Isaac, and **BULMER**, William.—Making pipes, &c., and drying such articles.

Behind the dies, and connected with the clay chamber, is a smaller chamber cut off from communication with the clay chambers by a lever or door suspended from a fixed point. This lever or door has a short arm projecting at an angle into the clay chambers. In the latter there is a shaft fitted with three curved wiper blades, the action of which is this. As one of the blades comes in contact with the short arm of the door it raises it and the door, opening the way to the dies. The next wiper pushes before it a mass of clay, which being prevented from travelling round with the blade by the interposition of the opened door, passes on to the dies. The door then falls, and the next wiper blade pressing it down forces the clay through the dies.

The drying is effected in sheds provided with grooves or channels in the sides for the reception of movable shelves, upon which the articles are supported. "Fire contact with the "ground is broken, and the products of combustion are made "to pass through the articles on their way to the chimney."

[Printed, 2*s*. 4*d*. Drawings.]

A.D. 1860, December 10.—Nº 3028.

HUGHES, Richard Hugh. — "Improvements in means or "apparatus for supplying fresh air to mines and other "places."

The air may be collected in "apparatus similar to gas "holders of gas works, having a moveable upper part or "dome, and water or other suitable joints, with means adapted "to lift such upper part or dome to admit of air being collected "therein, whilst the weight thereof may be regulated to the

" force required, and the air therefrom will be conducted by " a main or mains, and thence by branches readily attachable " to " channels, galleries, " tunnels or other workings, for the " purpose of supplying fresh air thereto, or air adapted to " neutralise any unpleasant gas." The air may be dried in its passage.

[Printed, 4*d*. Drawings.]

1861.

A.D. 1861, January 30.—N° 249.

PHILLIPS, HENRY, and **BANNEHR**, JAMES. — Trap for drains, &c.

This invention relates chiefly to the construction of urinals, but it also has reference to an improved trap. This trap is intended to be fitted to a drain at a spot where it may be desired to bring in a pipe from the urinal, and also another pipe for rain or drain water. The drain pipe is surrounded near its top with an annular gutter, which in its turn is surrounded by a second annular gutter. A boxed cover fits over the top of the drain, its sides dipping into the outer gutter. The liquid from the first drain empties into the inner gutter, and rising over the edge of the drain pipe passes away, sufficient liquid remaining in the gutter as a seal. The rain or drain water flows into the outer gutter, and passing through perforations in the sides of the covers falls also into the drain. Water likewise remains in this gutter to form a seal.

The Specification also describes a species of trap or effluvia-tight lid for an urinal chamber.

[Printed, 8*d*. Drawing.]

A.D. 1861, February 23.—N° 470.

SPENCER, THOMAS.—Moulding clay pipes.

This invention relates to improvements upon that for which Letters Patent were granted to the present inventor, A.D. 1848, (No. 12,115) and is applicable to machinery in which the direct action of steam, water, or air is used for forcing the plastic material.

It relates to the use of moulds for the above purpose, which moulds are contrived to make both socket and barrel, in place of using a compound mould. The mould is made in halves, sliding in guides under the mouth of the clay chamber. The core is supported in the mould by a flange or shoulder round the inside of the halves. No dod is used, the clay being directly compressed into the space between the mould and the core. The interior of the mould is to be left rough from the sand, so as to furnish a surface for the application of talc or other lubricant. The mould is also perforated for the escape of moisture or excess of material. Pieces of cloth may also be used over the core or mould to prevent adhesion, the cloth being removed from the moulded article.

Cores are also to be made of india-rubber or otherwise contractile, to facilitate removal and to obviate the use of lubricants.

[Printed, 10*d*. Drawing.]

A.D. 1861, March 30.—N° 783.

GRIFFITHS, **John**. — (*Provisional protection only.*) — Cements for "gutters, valleys," &c.

Battens or strips of woodwork are first secured in the required positions, and then covered with cement. The following method of applying this material is described :—" Layer " 1st, which is prepared with alcal or other lime or cement, " hair, and fine cinders ; this is left to dry with the top " scratched ; layer 2nd is similar to the first, but as soon as " applied is sprinkled over with riddled cinders, which are " forced about half way into the lime or other cement ; layer " 3rd is of hydraulic or other lime or cement mixed with fine " ashes or cinders riddled through a finer mesh than those " used in the 1st and 2nd layers ; layer 4th is of hydraulic or " other lime."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 25.—N° 1040.

STRANGMAN, **Edward**.—(*Provisional protection only.*)— " An improved method of and apparatus for intercepting and " carrying off the sewage of large towns, and preventing the " defilement of rivers thereby."

" being sufficiently large to allow the water to pass into the " inverted box on the under side of the lid and escape through " the opening on the top of the truncated pyramid into the " sewer, the sediment remaining in the bottom of the box, from " which it can be readily removed."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 5.—N° 2211.

EFFERTZ, PETER.—Machinery for making "drain pipes," " gutter tiles," &c.

The clay is fed into a chamber from a hopper. It is then mixed by a combination of screws, which pass it on through a grid, which intercepts stones, &c. Other screws in front of the grate then seize the clay and force it through the die. The issuing stream of moulded clay is received on a rolling table formed of rollers placed transversely to the stream of clay. This moving stream causes the rollers to rotate, and they by their movement, set in motion the cutting apparatus for dividing the clay stream into the required lengths.

[Printed, 2*s*. Drawings.]

A.D, 1861, September 13.—N° 2271.

OLIVER, JOSEPH.—(*Provisional protection only.*) — Machinery for making earthenware pipes, &c.

The clay is placed in a hopper with a gridded bottom. Here it is submitted to the action of a number of tilt hammers which crush the clay and force it through the grid, into another chamber. Thence it is expressed on to a table by means of a " horizontal hammer connected with an eccentric communi- " cating alternate motion to the same, and a knife is fixed in " front " of the orifice to divide the clay "to the required " breadth for the mould."

The inventor then proceeds to describe the manufacture of bricks by pressure in moulds, and he concludes by saying that pipes can also be made by using dies suitable for the purpose.

[Printed 4*d*. No Drawings.]

A.D. 1861, September 24.—N° 2382.

DAVEY, THOMAS.—Safety fuses.

This invention consists, firstly, in substituting or partially *substituting* wire for the fibrous strands of miners' fuses.

These wires are twisted round a central core of powder, and the partially manufactured fuze is then passed through gutta percha, waterproof varnish, soft metal, or other suitable substance. Finally, it is passed between rollers, or otherwise submitted to pressure.

Part of the invention also applies to the manufacture of pipes by casting soft metal, or gutta percha, bitumen, earthenware, &c., round a spiral of wire, the resulting tube being then reduced by rolls or hydrostatic pressure.

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 2.—N° 2452.

RÉROLLE, DENIS.—(*Provisional protection only.*)—Apparatus for "digging drainage ditches" or "for "cutting soft "rock."

The apparatus is worked by a steam engine and is carried on a wheeled carriage.

"The apparatus for digging consists of a wheel with teeth "which turning from below upwards, raises the earth and "throws it off in such way as to allow the passage of the ma- "chine. This wheel is put in motion by another wheel with "rollers which catches directly with its teeth; it is usually "furnished with scrapers." An inclined plane or endless band may be used to remove the excavated earth, and where the endless band is of great length it is supported at intervals by smaller endless bands, to each of which motion is given.

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 12.—N° 2554.

CARTWRIGHT, MATTHEW.—(*Provisional protection only.*) —Stench traps.

The invention consists in covering the closing surfaces of the trap with vulcanized india-rubber, alone or in combination with other materials. The joint may also be "disposed so as to "form a species of tongue and groove," the projecting rib and the groove being packed as above.

"According to another arrangement applicable to sinks and "sewers a cylindrical box or case is used having a lid or cover "(packed with india-rubber) screwed down thereon by means "of a central screw spindle and handle so as to exclude all "effluvia."

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 2.—N° 2763.

SPENCER, Thomas, and **ROBINSON**, Thomas.—*(Partly a communication from Alfred Delafol).*—Making earthenware sewage and other pipes.

The invention refers partly to those machines in which direct action of steam or other fluid is used for actuating the pressing ram, and consists in the employment of additional power, in order to maintain the pressure after the moulding has been effected and to work with less pressure of fluid. The additional power is derived from the use of a weighted box or cistern pressing on the ram through the agency of racks or pinnions or directly as the case may be.

Pipes are to be made with an enlarged part at one end, in the thickness of which is fashioned an annular groove or recess. The reverse end of another pipe is to be fitted into this recess to make the joint.

Pipes are to be made by forcing the plastic material through an orifice fitted with a core, into a mould formed by hemispherical plates worked by levers to form an end. The mould is then opened so as to allow the pressure to force forward the material for the barrel, the second socket being formed in another mould.

[Printed, 1*s*. Drawings.]

A.D. 1861, November 13.—N° 2865.

FRICKER, Henry Robinson, and **MANLEY**, John.—"Improvements in apparatus for facilitating the cleansing of sewers and other watercourses or ways."

The apparatus consists of a number of fans or blades arranged round a central shaft, in such a manner that the passage of the shaft longitudinally through the water or mud causes it to rotate. The fan stirs up the mud which is then carried away by the flowing water. To prevent injury to the sides of the sewer, the ends of the shaft are supported on wheels. A swivel is placed between the hauling rope and the apparatus.

[Printed, 6*d*. Drawing.]

A.D. 1861, December 11.—N° 3104.

PERCY, William Carter Stafford.—*(Provisional protection only.)*—Machinery for making pipes, &c.

Part of this invention relates to a machine for making pipes. A pug mill is used, having its axis in a horizontal position. The lower half of the pug cylinder is perforated to act as a screen for the cleansing of the clay. "The screened material "falls upon an endless apron, which conveys and delivers it "to an arrangement of three rollers, all with their axes in a "horizontal position. No. 2 roller is placed above No. 1 "roller, the axes of both rollers being in the same vertical "plane; and No. 3 roller is placed, with its axis, in the same "horizontal plane as No. 1 roller. Spaces are left between "No. 1 and 2 and No. 1 and 3 rollers. No. 1 and 2 rollers "are used to force the material through moulding orifices for "making pipes," &c. "and No. 1 and 3 rollers are used to "force the material into a chamber which delivers the clay "into mould boxes" for bricks. The machine is not intended to be used for both purposes at the same time, the rollers being worked as required by "doctors."

[Printed, *4d.* No Drawings.]

1862.

A.D. 1862, January 1.—Nº 11.

RHODES, Benjamin.—Making bituminous pipes, &c.

These articles are made up of some elastic fabric wound round a core saturated with bitumen. Stitches or wires are also used to hold the material together. A machine consisting of a core and rollers for working or piercing the bituminized fabric, is described; also an expanding core for pipes of large size. For giving final shape or finish to the articles, moulds are used.

The drawing shows pipes of various shapes, gutters and rain water pipes, &c.

[Printed, *8d.* Drawing.]

A.D. 1862, January 13.—Nº 96.

HEWITT, George.—(*Provisional protection only.*)—Drain tiles.

"In order that the ends of such tiles may more advan-" tageously than heretofore be made to go together with " spigot-and-faucet joints, one end of each tubular tile is" " cut into the forms of a hollow or concave cone, and the " other end is cut to the form of a convex cone."

The tile to be operated upon is placed in a holder or trough with suitably shaped ends, and "two hollow conical cutters" remove the partially dried clay to form the conical joints. The cutters are fitted to holders and rotate on a stem passing through the tile.

[Printed, *4d.* No Drawings.]

A.D. 1862, January 31.—N° 261.

HARGREAVES, John. — (*Provisional protection only.*)— " Improvements in the manufacture of pipes or tubes for " conveying water, gas, acids, sewage, &c.

The inventor first prepares a composition which he calls "a " bituminous mastic." He takes "all or any of the following " ingredients,—bitumen, cement, chalk, clay, flint, lime, oyster " and other marine shells, river or other sand, slag, and slate." He also employs and utilises "the refuse and short waste of " cotton, worsted wool, hemp, flax, tow, jute, cocoa-nut fibre, " and other fibrous materials, gutta percha, caoutchouc, gums, " and oils." The solids are dried, ground, and thoroughly incorporated by mixing. The bitumen is melted and to it are added the gums, oils, and fibre, and when these are thoroughly mixed the powdered mixture is added until a stiff plastic substance results.

This substance is made into pipes by forcing it, while hot, from a cylindrical reservoir through a die. It may also be moulded into "invert blocks for sewers."

[Printed, *4d.* No Drawings.]

A.D. 1862, February 4.—N° 290.

MANWARING, George.—"Improvements in flushing appa-" ratus for closets, sewers, and other water service."

The patentee makes use of "a cistern or vessel having a " small admission or inlet valve and a large outlet valve, the " former being near the top and the latter in or near the " *bottom* of the cistern. A vertical rod or spindle (hereafter

" called the connecting rod) connects the outlet valve with a " top lever at the upper part of the cistern, which lever is " capable of forcible depression by a wire or other mechanical " connection communicating with the seat of the closet, or " with a handle to be worked by hand; the depression closes " the outlet valve, and at the same instant a projection on the " connecting rod allows a ball lever which has been resting " upon it to sink at the ball end and to rise at the other end, " which latter comes in contact with and opens the inlet valve, " admitting the water, until the top lever is again allowed to " rise (in which case the projection would raise the ball lever " and permit the inlet to close) or until the accumulation of " water raises the ball and causes the same effect. When the " wire or other connection is released, the top lever is raised " to its former position by means of a counterbalance weight " or weighted shaft, which closes the inlet valve first, and then " opens the outlet valve, and allows the escape of the accumulated water for the flushing purposes. The cistern in the " intervals of its use has no water in, the supply to it taking " place only during the use of the closet or other forcible " depression of the top lever."

[Printed, 10*d*. Drawing.]

A.D. 1862, March 7.—N° 608.

NEWTON, Marcus Bourne.—(*Provisional protection only.*) —"Improvements in the manufacture and construction of " junction and other drain pipes in clay or other plastic " materials."

The invention consists in the construction of "junction or " other drain pipes used in the laying of drains and sewers, in " such form as to admit of their examination at any time, " without disturbing the pipe in its bed. . . . . And also of the " insertion of a junction arm or piece at any time when " connection is wanted to be made with the existing pipe or " drain, without affecting the flow of sewage matter therein."

The inventor claims "the making of man-hole pipes with " covers thereon, the hole being in the body of the pipe as for " a junction arm, and further the making and supplying of " loose junction arms, so that they will fit and can be inserted " in the man-hole pipe, the cover being removed.

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 21.—N° 1165.

CREEKE, Christopher Crabb.—Drain and other pipes.

The ends of the pipes are moulded "with wedge-shaped projections and recesses, which by an axial motion being "given to one of the pipes, shall serve to draw the ends of the "pipes together, and make a secure joint, preserving however "until the joint has hardened," sufficient elasticity to allow for depression at the joints. "Before thus securing the pipes" "suitable packing or cement is inserted between the abutting "surfaces," and the inventor also "lubricates the entire "surface of the socket and its counterpart, by which means, "when the pipes are laid in place and screwed up, water or "gas tight joints will be secured." Side sockets may also be added to the pipes for the insertion of branches, and these are kept closed by covers till wanted. In some cases the ends of the pipes are made plain and in this case the joint is made by means of a short sleeve pipe and cement or packing. To protect pipes when laid from superincumbent pressure, or from injury during disturbances of the ground a kind of trough pipe is inverted over them.

[Printed, 10*d*. Drawing.]

A.D. 1862, May 30.—N° 1623.

FOOTMAN, William.—(*Provisional protection only.*)—Draining land.

Part of this invention relates to the treatment of sewage and to the irrigation of land with liquid manure. Another part relates to a system of underground pipes for draining the land from water.

Rows of pipes are laid down across the land, a few feet below "the surface of the ground, but with much smaller intervals "between the rows than is now usual, and at as small a "gradient as possible, the rows leading to a ditch or other "ordinary outlet."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 9.—N° 1714.

LOVEGROVE, James.—"Apparatus for inspecting small "*sewers* and drains, and for facilitating the removal of ob-"*structions* therein."

The inventor connects the sewer and the surface of the ground by a group of three pipes. Two pipes are curved as they join the sewer in opposite directions, so that a cane passed down each will be able to pass up or down the sewer as the case may be. The third pipe is straight, and "admits of a rod " being passed down to clear or remove any obstruction in " the drain or sewer which is below such tubular passage." The tops of the pipes are suitably protected.

[Printed, 8*d.* Drawing.]

A.D. 1862, August 5.—N° 2201.

NICHOLL, John Richard.—(*Provisional protection only.*) —Uniting and disposing of sewage.

The sewers are lengthened by the addition of "broad diver- " ging channels, which from their extended surface will cause " a sluggish flow of the sewage." Each channel is fitted with " sluice valves, which permit of the discharge at suitable " periods of the sewage into removable tanks." Each tank forms a connection between the channel "and the outflow " sewer leading to the filtering basins provided for the disposal " by natural filtration of the liquid portion of the sewage." The sewage is made to pass a strainer before it leaves the removeable tank, in which it therefore leaves a deposit. This deposit is utilised as a manure, the effluent water being allowed to infiltrate the natural soil, chalk or gravel.

[Printed, 4*d.* No Drawings.]

A.D. 1862, October 6.—N° 2696.

HOLLAND, Samuel.—Pipe making machinery.

The clay is placed in a chamber mounted on wheels, in the bottom of which chamber the dies are fixed. This chamber is run under a vertical ram which is caused to descend into the chamber by hydraulic pressure, like the ram of a hydraulic press, and so to force the clay through the dies. The ram is raised by a rack and pinion worked by the power used to actuate the pumps. When empty the chamber may be removed and another substituted.

[Printed, 10*d.* Drawing.]

A.D. 1862, October 24.—N° 2863.

VIGNEULLE-BREPSON, Anne Jean Ferdinand. — Trap for drains.

The top of the drain pipe is enlarged and provided with an annular groove. This top is partially closed by means of a basin supported on these arms which rest in the annular groove. Above this basin is an outer basin, the rim of which is turned down and enters the annular groove. An opening in the centre of the bottom of this upper basin affords a passage for the water to the lower basin whence it escapes to the drain. The upper basin is partly immersed in the water permanently held in the lower, and the groove being also preserved full, escape of foul air is checked. In order to prevent choking in some cases disc valves are fitted, which open by the rising of the water in the trap above a certain height, and this system of valve may be supplemented by an electrical signal which gives a warning of the improper acting of the trap. A plug may also be fitted to be drawn out by hand when necessary, in order to allow the escape of mud, &c. Modifications of this trap are shown.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1862, October 30.—N° 2933.

BIRCH, James.—(*Provisional protection only.*)—Removing obstructions from drains, &c.

For this purpose a jointed rod, carrying suitable tools, is used. To enable this rod to pass projecting parts in the drain, "two or more antifriction rollers are mounted on a swivel "cross head or horizontal swivel pin, so that they may rotate "in either direction. This cross head or swivel pin is mounted "on a centre pin, round which it is free to rotate on the end "of the socket in which the centre pin is fixed. This socket "is screwed into the end of the jointed rod, which by the "addition of one length after another may be extended to any "length that may be required."

To remove fibrous masses obstructing drains, a worm or screw is fitted to the rod. For some kinds of obstruction a plunger of leather or such like substance is attached to the "rod, to be employed to force forward any obstruction by "hydraulic pressure."

[*Printed, 4d.* No Drawings.]

A.D. 1862, November 21.—Nº 3132.

WALKER, Thomas.—Utilising sewage.

The drain is connected, by a conduit, with a settling vessel constructed with inclined sides. The sewage runs into this tank near the bottom, deposits it solid matter and flows over the edge into channels which conduct it into the sewer again, or elsewhere for irrigating purposes. The deposited matter is pumped from the settling tank into other tanks. The liquid sewage may also be raised to higher levels to facilitate irrigation.

In order to prevent the escape of foul gases from sewers through street gratings, &c., it is recommended "that the " main be trapped near its outlet to prevent the air, as now, " passing into the sewer" "and thereby forcing back the " lighter gases." A tall chimney, with burning gas flames to insure a draught, should be used as a ventilator. A fan may also be used.

The pumping apparatus for sewage purposes, is constructed with the object of keeping the sewage out of the pumping cylinder. The latter is kept filled with clean water or oil, and its bottom is fitted with a flexible diaphragm which becomes the medium for acting on the sewage.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, December 9.—Nº 3303.

EFFERTZ, Peter.—Pipe, &c., machinery.

This is a further improvement upon the inventor's machinery, patented in 1861 (No. 2211.)

It consists in using three or more rollers for mixing the clay. When three only are used, two of them are placed in a horizontal line, the third being placed vertically under one of the others. The rollers are driven at different speeds, the first horizontal roller travelling slowest, the bottom roller the fastest. These variations may be variously accomplished. A greater space also is left between the two horizontal rollers than between the second and bottom roller, and the rollers revolve in opposite directions. Side plates are provided which form a channel fitted with scrapers to clear the rollers. The rollers force the clay through a die, after which the moulded stream is cut into lengths.

[Printed, 1*s.* 10*d.* Drawings.]

1863.

A.D. 1863, January 24.—Nº 221.

CLARK, WILLIAM.—(*A communication from François Triballat.*)—(*Provisional protection only.*)—Drainage and other syphons.

"This invention relates to an improved syphon, applicable "for exhausting water from mines, marsh lands, for the pur- "poses of irrigation and otherwise. The improvement consists "in the application of a float which closes the cock for passing "water when there is no longer any to remove, at the same "time said cock again opens on a return of water in the place "to be exhausted; when once in position the syphon works "automatically."

[Printed, 4*d.* No Drawings.]

A.D. 1863, February 20.—Nº 470.

HUSBAND, WILLIAM, and QUICK, JOSEPH.—(*Provisional protection only.*)—"Raising sewage and water."

A wheel or disc is provided with pistons at its periphery, which pistons work inside a segmental tube, the arms of the wheel or the disc moving in a valved longitudinal slot in the tube. The lower extremity of the segmental tube communicates with the sewage to be raised, and the pistons in their revolution, take up into the tube certain quantities of sewage and lift it to the top. A clearer is used in front of the pistons, to remove "rough work, dirt and grit."

[Printed, 4*d.* No Drawings.]

A.D. 1863, March 9.—Nº 647.

COWLEY, JAMES.—Pipe, &c., machinery.

The clay, which may be taken direct from the bank, is placed in a hopper and worked by the knives of a pug mill, which also force it down, into a receiving box, whence it is driven by a horizontally working piston, through the die. The piston is worked by cranks joined to connecting rods, coupled at their opposite ends to a shaft passing transversely through the piston. The shaft slides in slots made in the sides of the receiving box, which slots are covered with slides as the shaft moves. The machine described is for making bricks, but is also described as capable of modification for making pipes. In this case a vertical piston used for pressing the brick in the mould is removed, and the horizontal piston prolonged by the addition of a "wooden pad." Outside the die there is a cutting frame for dividing the lengths of pipe.

[Printed, 10*d*. Drawing.]

A.D. 1863, March 25.—N° 784.

GORE, THOMAS WILSON.—(*Provisional protection only.*)—Joining earthenware, &c., pipes.

The joint is made by means of a "grooved collar." "The " ends of two flanged pipes which are to be united are laid in " the lower half of a circular collar with a groove on the inner " face thereof in which the flanges fit, the joint being made " further tight, if necessary, by washers, cement or packing. " The other half of the circular collar is then passed over " those parts of the flanges not received within the lower half " and is made to fit on the edges of the said lower half. For " further security, if desired, a clamp or clamps may be fixed " on the collar."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 27.—N° 804.

TAYLOR, JOHN, junior.—"Rain water pipes."

"The lowest length of the number of lengths of pipe, which " together compose a rain water pipe, and the bottom end of " which descends into the trap," is made "of greater diameter " than the other pipes, in order that if there be any obstruction " in the trap or in the pipe this lowest length may be slid " upwards over the length of pipe above it, and thus have a " space between the trap and the lower end of the rain water " pipe; any matter that had accumulated in the trap can then " be readily removed from it, or any obstruction in the pipe

" can be pushed out at its end. The moveable length of pipe " is formed with lugs or projections upon it, by which the " pipe when raised can be held up, and by which also it is " carried when in its lowest position. The rain water pipes of " buildings may also in a similar manner be made with one of " the intermediate lengths of the pipe moveable, and this is a " convenient arrangement when no trap is employed."

[Printed, 10*d*. Drawing.]

A.D. 1863, April 15.—Nº 953.

FLETCHER, THOMAS BELL ELCOCK.—"Collecting the solid " portions of sewage."

The inventor employs "a receptacle or pan placed in any " position where it will intercept the passage of the sewage " from its source to the outlet. This receptacle is furnished " at or near the top with two bends, one for the ingress of the " sewage, and the other for the egress of the fluid portion " only, the latter being provided with a grating to prevent " solids being washed through. The advantages of this " arrangement are, that the solid sewage is collected, the fluid " passing away; the water by the arrangement of the bends, " acts as a double stench trap, and the grating operates as a " filterer."

[Printed, 8*d*. Drawing.]

A.D. 1863, May 1.—Nº 1096.

JONES, EDWARD.—(*Provisional protection only.*)—Drain blocks, and pipes; flushing drains; pumping sewage, trapping and ventilating; and sluice gates.

The invention relates, firstly, to the manufacture of "socketed " blocks, bricks, or pipes for constructing the drains." The machinery used is that for which the inventor obtained Letters Patent in 1858 (No. 1683), with the following improvements:—Additional spiral knives are added to the pug mill, for pressing the clay into feed boxes containing pistons, acted upon by cams. The clay is pressed out on friction rollers, or other moveabl bed, fitted with cutting apparatus. The reversed portions ar passed on to hinged pallet boards and sanded by suspende sifters. The moulds then descend and the pistons compre the pieces into the required form, which are then deliver from the moulds by cams and levers. The pistons are fitted with felted plates, the felt being kept distended by being edged with some stiffening material. The blocks may also be perforated, and means are provided for moving, and stacking them.

"In moulding drain pipes," "additional feed boxes with " spiral screws in them" are used, which screws ramify "from " the bottom of the pug mill." "The spiral screws are set " in motion by bevil gearing from the outside of the feed boxes " fixed to the spiral screws within, and the same being con-" tinually moved by the action of the pug mill shaft with a " continual supply of clay, an unceasing stream of piping will " be forced through the dies."

Another improvement "consists in procuring a good supply " of water for flushing out drains." Two water pipes are " fixed perpendicularly" "with a trough or reservoir of head " water connecting them. At the bottom of each pipe" is fixed "a valve or stop-cock, and a small stuffing box to act " like the piston of a steam engine, only stationary, and so " fixed as to allow a movable cylinder or pipe to work up and " down the required length for a given stroke as in a steam " engine. A valve is also fixed at the bottom of the working " part of the cylinder, which opens when at its lowest " extremity of descent, and at the same moment closes the " valve or stop-cock at the lower end of the perpendicular " stationary pipe, and in order to reduce the concussion" "a " small piece of elastic tubing" is introduced. "Below the " valve fixed at the lower end of the working part of the " cylinder the circumference is enlarged to from one to two " feet in diameter for 6 or 9 inches deep below which it " continues, a simple solid shaft or connecting rod attached to " one end of a beam below as in a steam engine, so that when " the valve" "is opened" "upon the elevation of the cylinder, " the force of the water in the standing pipe acting upon the " water in the enlarged chamber an increase of power is " obtained upon the well-known principle of the hydrostatic " paradox for forcing down the cylinder and one end of the " beam, and consequently causing the other end to rise with " similar cylinder and valves attached to the other stationary " pipe, and being connected to the end of the beam, the stroke " being repeated, a continuous up-and-down motion will be " procured."

Another part of the invention relates to a method of "re-"lieving the sewers at the outfall of low levels" by bringing "a number of hydraulic pumps to bear upon" valved cylinders of "large dimensions," working over vertical stand pipes, also valved.

Finally, the invention relates to a system of "trapping and "ventilating." "The sewage tank" described in the former Specification, "rests on a ledge of brickwork with feet so fixed "as to take their bearings at the bottom of the gulley. The "tanks in the street gulleys" are similarly formed, "with "provision for the bearings of the curved plates which form "the trap to rest upon." The curved plates are weighted to keep them down, but they can yield to any explosion that might happen. "The area and sink traps" are formed in "like "manner, and the area traps are so fixed as to break the con-"nection between the house drains and the main sewers." "Trap plates" are also attached "to the gratings and the "tanks, so that when the gratings are lifted up the traps and "tanks are lifted." Sluice gates "are also made" with a hollow space at the edges joining the frames for "the purpose "of passing hempen cordage along to form an economical "water-tight joint with tightening screws."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 5.—Nº 1118.

CHESSHIRE, EDWIN.—Intercepting sewage.

Between the closet pipe and the sewer is placed a cistern or catch-pit, into which all the sewage is first received. Here the solid is separated from the liquid portions, the latter passing off through strainers into the sewer. From time to time the lid of the catch pit may be opened and the solid matter removed, the quantity of the latter present being capable of being previously ascertained by gauging. The pipes may be syphon trapped.

[Printed, 8*d*. Drawing.]

A.D. 1863, May 11.—Nº 1177.

HARGREAVES, BENJAMIN.—Drain tiles.

"These improvements consist in making earthenware tiles "of a conical or taper-ended shape, so that the conical or taper "*end of one tile* fits into the wide end of the next one, and "thus prevents them becoming disconnected" by "settlement."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 15.—N° 1225.

MALLET, ROBERT TREFUSIS.—"Improvements in the construction of piers, walls, and other similar structures, and of landing stages, and in the connections therewith, or attachments thereto." The inventor describes the improvements as being also applicable to the construction of "covered ways, sewers, or tunnels."

The patentee sinks two rows of iron caissons, close together, one row on each side of the intended structure. Upon these caissons he erects a coffer dam of buckled plates bolted on to framing, which is placed between piles. The piles are also grooved so as to allow a cross partition of plates being placed here and there between the parallel rows. Thus by means of two of these transverse partitions a chamber or dam is constructed in which, after the water has been removed, the work may be constructed. As soon as a length has been completed another division is built up, and the water is prevented from entering by building round the finished work a partition of buckled plates with india-rubber packing or clay puddle. This last portion fits the outline of the work as closely as possible, and the elastic packing or puddle makes it water-tight.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, May 19.—N° 1255.

KELLY, JOHN.—(*Provisional protection only.*)—Treating peat and manufacturing drain pipes therefrom.

A mass of peat is pared down and partially separated from the bog to allow it to drain. Pipes are then cut from it by using "suitable metal tubes," which pipes are then stacked for considerable time to dry. Or masses of peat, after having been thus stacked may be "moulded by an ordinary tile machine into pipes for draining."

[Printed, 4*d*. No Drawings.]

A.D. 1863, June 15.—N° 1492.

FORRESTER, JOHN.—Glazing pipes, &c.

The articles when partially dried are coated with the glazing composition, either in a liquid or dry powdered state, and fired. "Any vitrous compound ground fine and sifted "previous to using" is employed for the glaze. If requisite, colour in the shape of an oxide or earthen compound is added.

[Printed, 4d. No Drawings.]

A.D. 1863, June 20.—N° 1550.

PETERSON, CHARLES.—New material for sewer and other pipes, &c.

Vegetable fibre is boiled with caustic alkali and reduced to pulp. It is then mixed with some bituminous substance, previously saponified with caustic alkali. Some alum or sulphuric acid, or both combined, is then added, and the mixture moulded as required,

For fine work, a small quantity of farinaceous dust is mixed with the material.

[Printed, 4d. No Drawings.]

A.D. 1863, July 29.—N° 1880.

BONNEVILLE, HENRI ADRIEN.—(*A communication from Louis Melotte.*)—Flushing sewers, &c.

Two methods of accomplishing this object are described. They may be used together or separately.

In one a cistern is fitted with two floats, a valve, a syphon outlet and a waste pipe. As the water rises in the cistern, the floats rise with it. One float as it rises opens the valve and allows the water to flow into the syphon outlet, a hook or crotchet engaging with studs on the valve spindle to hold it open. As the water level falls, the floats fall, and the second of them coming down on to a lever attached to the hook or crotchet causes it to release the valve, which then closes. The waste pipe admits air for discharging the syphon. The floats may be adjusted and the flushing made more or less frequent as desired.

The other apparatus consists of a swinging or tipping basin, which is caused to overbalance itself as the water rises and so turn its contents into the flushing outlet. A partition is fitted in the basin to direct the outpoured water, and so to prevent the basin turning over from striking the stops too violently.

[Printed, 10d. Drawings.]

A.D. 1863, August 6.—N° 1940.

TENWICK, John.—"Valves and traps for sewers."

This is a self-acting floating valve in combination with a trap and is intended for use in places where there is a liability to back flow, from tide or other sources. The valve is a hollow sphere of metal or other material, which is passed upward by the rise of the sewage, against an elastic seating. The sewage water first flows in a trap and thence through the seating to the valve chamber and thence to the sewer. Various modes of carrying out this principle are shown.

[Printed, 2*s*. Drawings.]

A.D. 1863, August 7.—N° 1950.

MULHOLLAND, Frederick George.—(*Provisional protection only.*)—" Pipe castings for sanitary and other pur-
" poses."

The pipes are " cast straight and of uniform diameter
" throughout (the ordinary enlargement for jointing being
" dispensed with, and in lieu thereof a collar run loose into
" position over each junction," and an elastic composition poured in. " The pipes are tapered or halved into each other
" (in the thickness of the metal only) at either end, so that
" when laid each pipe overlaps its neighbour, and in case of
" expansion or contraction there is always ample room for
" play in the junction without reducing the diameter or
" strength of the pipe ends."

The composition for making the joint consists of vulcanized india-rubber, resin, and tallow, shoddy or fluff, and prepared phosphorous to prevent decomposition of the india-rubber.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 8.—N° 2208.

BAKER, Thomas Henry, and FRIEND, George.—Treating sewage matters.

Part of this invention relates to the construction of the sewers, with the view to effect a separation of the solid and liquid portions. The sewage is conducted into a receiver, furnished at the lower part with a screen which retains articles as stones, &c. The less fluid sewage passes through the screen into another receiver, whence it may be pumped or removed.

The more fluid part rises in the receiver to the upper part of it, which is provided with a filtering cover. After passing upwards through the filter, the sewage overflows and may be run into an adjacent stream, or elsewhere, as desired. A storm reservoir, communicating with the sewer by flood gates, is also provided. An intercepting grating may also be placed in the sewer at a point in advance of the separating receiver. To facilitate deodorizing, a hopper containing the deodoriser may be placed over the sewer, the substance being passed into the sewer by means of revolving apparatus worked by the portion of the sewage diverted into a chamber for the purpose.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1863, September 22.—Nº 2335.

EFFERTZ, Peter.—(*Provisional protection only.*)—Cutting moulded pipes, &c., into lengths.

This invention is intended to provide the necessary motion for the cutting frame and wires, and to cause the stopping of the machine at required intervals according to the length of the pipe to be cut.

A disc having upon it an eccentric groove is fitted at one end of a shaft; the other end is furnished with certain projections. The short arm of a double lever is fitted with a bowl, which works in the eccentric groove, the long arm being jointed to the cutting frame. As the disc revolves the long arm is therefore caused to work the cutting frame, and the above-mentioned projections serve to throw out of gear a clutch to stop the machine at given intervals. A hand lever is provided by which the operative is enabled to throw the machine into gear again, "or instead of working the lever by hand a "knob or projection on a measuring wheel or other self-"acting contrivance may act on the lever and put the cutting "frame in motion."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 22.—Nº 2337.

BOND, John, and BOND, James.—Machinery for making drain pipes, &c.

A pug mill is placed horizontally or otherwise, "with its shaft "*continued* through the open end of the pug mill cylinder, and

" having one or more knives, or wires, or series of cutters " volving on the outer end of the pug mill, for the purpose " cutting flakes or flat pieces of clay or other plastic material." These pieces fall between rollers and thence into a worm, which delivers the clay through the dies. In order to preserve the form of the moulded pipes, they are received on rollers made with hemispherical grooves or channels. The rollers may be covered with leather or other material.

[Printed, 10*d*. Drawing.]

A.D. 1863, October 5.—Nº 2432.

TOMLISON, Charles.—(*Provisional protection only.*)—" Improvements in taps, cocks, hydrants, or valves, and apparatus connected therewith, for opening, closing, regulating, " and facilitating, and otherwise controlling the passage or " flow of water, air, steam, gas, and other fluids and liquids."

Part of these improvements refers to valves and plugs used in connection with the cleansing and flushing of sewers, and the discharge of sewage matter from drains, and consists "in " applying a bar of wrought iron or other material with a " screwed spindle moving through a similar screw in the bar, " both being used for opening, closing, and governing the " passage of the air cock or hydrant, known as Bateman and " Moore's Patent (No. 12,032) dated 1848. The object of this " bar and spindle being used is to control the flow of the liquid " without the use of the stand pipe, or long key now used for " the purpose, and independent of the pressure of the liquid; " suitable catches and bearings will be added to ensure efficient " working, and the spindle will be sufficiently short to admit " of its being left in the street box ready for use." The screwed spindle may also be placed "at one side of the ball or other " valve instead of at the top." The spindle when turned moves the valve. "The valve may be so fixed as to allow of its open- " ing when the pipe or other vessel is empty so as to permit " the escape of air, and also to allow the valve by self action " to close the passage when the pressure of the liquid, steam, " or gas is sufficient; but the screw may have the power of " absolutely opening, closing, or regulating the passage." The remainder of this Specification is abridged in another series.

[*Printed, 4d. No Drawings.*]

A.D. 1863, October 31.—N° 2708.

J[illegible]ES, Edward.—Making drain pipes, and traps.

For the former purpose the inventor makes use of the machinery patented by him in 1858 (No. 1683), with improvements. Additional spiral knives are supplied to the pug mill. Various improvements are added to the machine for the purpose of making bricks, and in moulding pipes, the patentee uses "additional feed boxes with spiral screws in them, rami-" "fying from the bottom of the pug mill; the spiral screws are" "set in motion by bevil gear outside the feed boxes, and fixed" "to the spiral screws within, and the same being kept in" "motion by the action of the pug mill shaft, with a regular" "supply of clay, a continual stream of piping" "will be" "forced through the dies."

The improvements in traps are intended for watercloset purposes, and do not therefore appertain to this series of abridgments.

[Printed, 8*d*. Drawing.]

A.D. 1863, November 14.—N° 2849.

BARKER, George.—Syphons for sewage and drainage purposes.

The sewage is run into a tank or reservoir whence it is removed continuously by a syphon. The other end of the syphon is immersed in the outfall reservoir and may be some distance from the receiving reservoir. The latter is made with an inclined bottom for the purpose of collecting sediment, which may be removed by a chain pump or otherwise. As the sewage rises in the reservoir it passes into the syphon and thus to the outfall. House drainage may be similarly run into a tank through a grid and thence into the syphon. This tank is fitted with a kind of diaphragm dividing it into two compartments. Several tanks may be connected with the one syphon.

Similar syphons may be used for removing the drainage water from lands or overflow from rivers, into the sea.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1863, November 26.—N° 2973.

SIMMONDS, James.—Stink traps.

This invention consists in adapting to the upper part of the D trap, the flat part of the trap being horizontal as usual, a nick piece or opening fitted with a cover, by the removal of which access may be gained to the trap for removing obstructions. Tó this cover, in the case of waterclosets, is fitted the air pipe.

For sinks, the traps may be cylindrical or square, with a grid at the top. The interior is divided by an inclined diaphragm, one side of the divided chamber being in connection with the drain. An aperture is made in the inclined diaphragm and fitted with a cover, attached by screws. This aperture is useful also as a means of access to the interior of the trap and water pipe.

"In fixing this trap, it having no fixed flange," it is pushed up "from below the slab or plate "in which it is to be "fixed," and a "cupped flange" dropped "on it from "above," and fixed to it by screws or otherwise. Upon this again is fixed the grid.

[Printed, 8*d*. Drawing.]

A.D. 1863, December 24.—N° 3265.

BOWDITCH, William Renwick.—(*Provisional protection only.*)—Supplying air to lights in mines.

Air is compressed into a receiver, and thence conveyed by pipes to the lantern or lamp. It flows into the lamp at the bottom, and apertures for the exit of the products of combustion are provided. "The air being supplied to the lantern "under pressure prevents the entry of fire-damp and of any "other dangerous gas which may surround the lantern." To regulate the force of the supply, impediments, such as taps, plugs, or wire, are fitted to the pipes.

The waste air from engines may also be used. The inventor also proposes to use compressed air by allowing it to escape under and around unprotected lights.

[Printed, 4*d*. No Drawings.]

1864.

A.D. 1864, March 22.—N° 720.

EFFERTZ, Peter.—(*Provisional protection only.*)—Cutting apparatus for pipe, &c. machinery.

water shall assist the current of air. In order to increase the effect a flap door is fitted in the sewer, just below the mouth of the furnace duct, which door allows the water to flow on but intercepts the air.

[Printed, 2*s*. Drawings.]

A.D. 1864, May 9.—N° 1169.

EMPSON, John Fielding.—Drain pipes, &c.

This invention relates to a new material, consisting essentially of a base or foundation of paper or other fibrous material, "upon the surfaces of which pounded slate or other gritty "material is made to adhere by means of tar or pitch, or a "mixture of tar, pitch, and asphalte, or other bituminous "matter;" or it may be "a material consisting essentially of "a mixture of gas tar, pitch, and asphalte, or other bituminous "matter, combined with hay or chaff, waste flax, or cotton, or "other fibrous or binding material, the said mixture being "made into a plastic mass, and formed into sheets or slabs, "or moulded or pressed in dies."

Either of these materials may be fashioned into drain pipes.

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 27.—N° 1314.

CLARK, Daniel.—"Improvements in stench-trapped gullies."

"The object of this invention is to construct a stench-trapped "gully with a removable sludge box having slits, perforations, "or a kind of vertical grating cast on to the top thereof, so as "to prevent anything but water passing into the drain; and "to construct a third stench trap for the more effectual "prevention of smells arising from the drain, such trap also "acting as a protection and seal to the drain when the top "grating and sludge box are removed. I also claim to have "further improved the sludge box by the introduction of a "moveable handle and casting of a bottom handle on to the "box, and to have effected an improvement in casting the "hopper on to the top grate instead of being cast separately "and secured thereto by screws or rivetts as heretofore in "other gullies. The improvements combined secure a gully "affording the most perfect security against smells arising "from the drains, the interception of all sediment matter in a "box easily removed and emptied by means of the handles

" attached to it, and the trapping or sealing of the drain from " all risk of anything passing into it while the box is removed."

[Printed, 8*d*. Drawing.]

A.D. 1864, June 8.—N° 1423.

BRAGG, Aston, and BRIDGEMAN, George William.—(*Provisional protection only.*)—Raising in mines and sewers, &c.

The inventors propose to use screws for this purpose, which screws are made in lengths, at one end with a socket, at the other with a plug. The plug end of one length is inserted in the socket of the other, and united by bolts or otherwise. In this way screws of any length may be made.

They may be used in "the shafts of mines and the various levels therein, for communicating motion to the buckets or " 'kibbles' for conveying the ore up to the main shaft."

Also "for the conveyance of earth and rubbish from place to " place in making tunnels, sewers," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 27.—N° 1608.

SAVAGE, William Peacock.—(*Provisional protection only.*)—Drain tiles.

The object of this invention is to remedy defects in land drainage, caused by the lateral displacement of the tiles.

When the drain is made of horse-shoe tiles resting on flat sole tiles, the latter are furnished with side flanges. The horse-shoe tile being laid between the flanges cannot move laterally out of its place.

Similarly when pipes are used, a sole tile is placed under each joint. This tile is flat at the under side and concave at the upper to fit the shape of the pipes.

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 26.—N° 2360.

HARRISON, John Atkinson.—(*Provisional protection only.*)—Utilising slag for sanitary pipes.

This invention consists in making "sanitary" and other pipes, &c., by running molten slag into moulds with or without pressure or other appliance, or chemical or mechanical mixture with other substances.

The articles are annealed by exposing them or passing them through ovens or covered ways either above or below the surface of the ground.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 4.—N° 2440.

DOBSON, Thomas.—Pipe, &c. machinery.

The clay is placed in a vertical cylinder, in the centre of which is a shaft carrying a number of radial arms or disintegrators. These break up the clay and force it down upon curved blades working horizontally, like a screw propeller placed on its side. These blades force the clay outwards through apertures furnished with proper dies, in a continuous stream.

[Printed, 10*d*. Drawing.]

A.D. 1864, October 18.—N° 2574.

PETTIT, Charles.—Rolling gutters.

This invention chiefly relates to the manufacture of corrugated plates, for which purpose a series of rolls is employed. The first pair of rolls makes corrugations in the centre of the plate, the next pair makes corrugations on each side of the last made and so on. By this process the strain on the metal and the consequent absorption of power is avoided. This principle is carried out in the manufacture of gutters, which are also rolled by a series of rollers.

[Printed, 10*d*. Drawing.]

A.D. 1864, November 9.—N° 2782.

REED, Samuel Cartwright.—(*Provisional protection only.*) —"Traps for drains, sinks, gulleys and other places."

The invention consists "in suspending a valve or valves, but " by preference two valves, at a convenient distance apart in " the box or case of the trap." "The valves are fitted with " trunnions, which are loosely hung upon supports attached " to or cast in a piece with the sides of the box or case. These " valves are free to move inwards and towards each other, " but motion in the contrary direction is arrested by their " abutting each against a metal plate inclining upwards and " terminating against the ends of the box or case, and in such " manner that when the valves are in their normal position,

" an acute angle is formed by the inclined plates and them-" selves. A pointed hood or roof shaped cover fits over the " valves, and receives the first shock of the water and refuse " that falls through the grating above, and by reason of its " shape it guides or distributes the sewage as near as may be " in equal proportions on each side; as the sewage so falls it " passes between the inclined surfaces and the valves to the " drain or sewer below, the said surfaces being inclined, " preventing the stoppage thereon of any substance. As soon " as the sewage has passed, the valves close and are so at all " times except when opened by sewage passing through. In " the event of one valve becoming choked the other is free and " sufficient to take off on all ordinary occasions, the sewage " that passes through." The hood can be lifted and the " valves removed for cleaning. The box is made somewhat " larger at top "to allow ample space for the motion of its " valves." These traps "are fitted by preference immediately " beneath the ordinary grating."

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 16.—N° 3120.

BROWN, GEORGE.—(*Letters Patent void for want of Final Specification.*)—Cylinders used in pipe, &c., machines.

Instead of making the interior of the clay cylinder with a smooth surface, it is formed "with a series of ribs, grooves, or " projections thereon, set by preference in a spiral form, and " arranged at distances apart according to the quality of the " clay under treatment. By fitting or making the cylinders" in this manner, it is found "that the clay is driven or forced " through the cylinder by the ordinary screw with much " greater facility and effect than when the surface of the " cylinder is smooth."

[Printed, 4*d*. No Drawings.]

1865.

A.D. 1865, January 26.—N° 220.

SMITH, WILLIAM.—(*Provisional protection only.*)—Machinery for compressing "clay into bricks, tiles, pipes," &c.

This machinery "consists of a cylindrical multiple mould, "the moulds being formed round the periphery of the said "cylinder or wheel, which is caused to rotate upon a shaft in "the centre. Each mould is fitted with a sliding and hinged "lid, which is moved, opened, and closed by self-acting "guides, and when closed and acted upon by the rollers in "the manner herein-after described presses the materials "into the mould. The materials are fed into the machine at "one side, and delivered at the other when compressed. The "lids are open, and kept open, through about one-half (more "or less) of the cylinder's rotation on one side, and are gradually closed by contact with rollers converging in a curved "line to the periphery of the cylinder on the other. These "lids are made of flexible plates, and are fitted with flexible "hinges, to allow them to take the curved form when closing. "In the bottom of each mould a piston is fitted, which presses "upon the solid material when compressed, and delivers the "same as the cylinder rotates. These pistons work in and "out by guides, so that the machine is rendered self-acting, "self-feeding, and self-delivering by the simple rotation of "the mould wheel, and simultaneous movements of the lids "and pistons."

[Printed, *4d.* No Drawings.]

A.D. 1865, February 16.—N° 451.

SMITH, Richard.—Ventilating sewers.

The sewers are divided into sections by means of valves or doors which rise and fall with the flow of the sewage. The air from each section is exhausted into the next by means of a fan or otherwise, and finally drawn off into a ventilating furnace and shaft. If preferred each section may be furnished with a ventilating shaft. In combination with this system of constructing sewers, the patentee proposes to connect the chimneys of houses with the sewers and also to turn in waste steam, so that the smoke and steam are got rid of and the sewers disinfected at the same time.

The invention also relates to disinfecting compositions, but no particular design of sewer construction is needed for their use.

[Printed, 1s. Drawings.]

A.D. 1865, March 13.—N° 698.

BRAGG, John.—(*Provisional protection only.*)—Traps for drains, sewers, sinks, shafts, &c.

The trap consists of a box or chamber, "connected at the " top with a supply pipe or other passage, and at the bottom " with the discharge passage." It is divided internally by an " oblique partition to the front or lower edge of which is " jointed a flap or valve cover, capable of covering the opening " between the fixed oblique shaft or plate and the opposite " side of the chamber or box. This vibrating flap is fitted on " the back or constructed with a weighted lever, which extends " backwards beneath the oblique fixed plate, which has the " effect of keeping the vibrating flap closed when not acted " upon from above. To prevent the dirt getting into the " hinge of the vibrating flap or valve the lower edge of the " fixed oblique shaft may be formed with a step, to the front " or lower edge of which the flap is jointed, when a piece of " metal or other suitable material is laid in and secured " thereto, so as to cover the top of the hinge joint, forming a " guard thereto." "If necessary, the edge of the vibrating " flap or valve may be fitted on the edge with india-rubber or " other elastic material."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 25.—N° 849.

BARNES, Richard William.—(*Provisional protection only.*) —Examining tunnels, drifts, sewers, &c.

This invention consists in the following :—

Firstly, an improved lantern formed with a double casing, the space between the two cases forming a chamber or passage for the supply of air to the lamp. This lantern may be sunk in water if necessary, and is fitted with a socket for the reception of a staff by means of which it is manipulated.

Secondly, a "reflecting apparatus, which consists of a " suitable framework provided with a similar" socket for the staff. In the framework, a reflector is mounted, and is "so " arranged as to be adjustable to any required angle upon its " own axis by means of a tangent screw or other suitable " means.

Thirdly, a staff, which, for the sake of portability, is jointed and may be folded up. This staff is graduated and may be used, if desired, as a levelling staff. It is fitted with pulleys and cords, by means of which the position of the lantern or reflector may be adjusted. By means of the above apparatus light may be thrown from the lantern, held by one staff, on to the reflector held by another staff and may thence be reflected in any required direction. By this means the state of the interior of sewers, excavations, etc., may be ascertained without having to descend into them.

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 13.—N° 1058.

COTTERILL, Charles Forster.—Joining pipes for conveying water, &c.

The joint is made in a socket formed on one end of the pipe, or in a moveable thimble. This socket or thimble is conical in shape, "the narrow end of the cone being turned outwards, " that is, forming the open end of the socket. The narrow or " outer end of the socket is of slightly larger diameter than " the plain end of the pipe, so that the plain end of one pipe " can be inserted freely in the socket of the next." Lead or composition is run through a hole in the socket or thimble, into the space between the end of one pipe and the conical socket or thimble of the other. The packing thus forms a conical ring and "any pressure within the pipes tends to " wedge it more tightly between the socket and end of the " pipe."

As a composition for making the joint, the inventor proposes a mixture of one part by weight of pitch, and two parts of sand.

[Printed, 8*d*. Drawing.]

A.D. 1865, August 23.—N° 2167.

NEWTON, John.—Stench trap.

This apparatus consists of the following parts:—An iron grating, attached to a hopper, fitted upon a "sludge box," to the side of which "is cast or attached a syphon arm or branch" forming the trap. This syphon arm is divided by a midfeather, " and it is also provided with a moveable lid or stopper for

" the purpose of introducing a hose pipe for flushing or " inspecting the sewers or drains." The hopper " reduces " evaporation to a minimum," and prevents freezing of the " contents of the 'sludge box.'"

[Printed, 8*d*. Drawing.]

A.D. 1865, August 29.—N° 2220.

GUMMER, William Henry.—" Stench trap and sink pipe " protector."

"The top or head of the sink or other pipe is formed or " provided with a socket or cup-shaped enlargement having a " projecting flange or lugs outside the upper edge. To this " flange (or to the lugs) is rivetted or otherwise fastened a " flat or slightly dished plate, the central part of which is " perforated or formed into a grate, and is provided beneath " with a short trumpet-shaped tube, the lower end of which " dips into a cup suspended in the centre of the socket or " cup-shaped enlargement at the head of the pipe." The cup and the dipping tube make a seal, and the cup serves also to retain any solid matter. Or a loose sludge box may be added, which can be removed and cleaned without untrapping the pipe.

[Printed, 8*d*. Drawing.]

A.D. 1865, September 25.—N° 2446.

BARNES, Richard William. — (*Provisional protection only.*)—This invention consists in an application of reflectors to be used with a lamp on the solar light, in "examining " sewers, tunnels, &c." For levelling purposes a staff, described in the Specification, is to be used in conjunction with the lamp and reflector.

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 25.—N° 2451.

BROOKE, Edward, the younger.—Ventilating and deodorizing sewers.

A pipe of earthenware or other material is inserted through the crown of the sewer or, by means of a socket, into the drain pipe. The upper part of this pipe is fitted with a tray of galvanized iron covered with charcoal or other deodorizing substance. The foul air from the sewer passes up the pipe and through the tray into the open air. The tray is protected from wet and dirt by a cover, and the whole is placed under a grid. The pipe also serves as a means of inspecting the condition of the sewer.

[Printed, 10*d*. Drawing.]

A.D. 1865, September 28.—N° 2499.

COTTAM, Edward.—Traps for drains.

This invention consists "in the employment of a double or "hollow dipping plate so as to form an intercepting chamber "or space, and in carrying a pipe or tube from this chamber "or space into the external atmosphere or otherwise away. "The object of this double or hollow dipping plate or inter-"cepting chamber is to prevent the return through the trap "into the stable or other place where the trap is fixed of any "effluvium." "Any gases tending to return through" this trap "bubble up into and pass off through the chamber or "space between the double plate."

Various forms are shown and described.

[Printed, 10*d*. Drawing.]

A.D. 1865, September 29.—N° 2503.

COTTERILL, Charles Forster.—Making connections in, stopping, and preventing leakages from pipes.

For boring earthenware or other pipes, for the purpose of making connection with a branch, a collar or strap is placed round the pipe, with a thickness of india-rubber under it. A hole is bored through it and screwed to receive the branch. When placed on the pipe, the boring tool is fitted and caused to bore the pipe through the previously prepared hole. When the pipe is bored the branch is screwed into the hole in the collar.

For closing the ends of such pipes, similar frames or collars are used, but in this case they serve to support screws which compress a disc, faced with india-rubber, against the open end of the pipe.

Where pipes are cracked similar collars are placed on the pipe, and cement of the kind described in the inventor's Specification, N° 1058 (A.D. 1865), or some other like material, is run in between the collars and the pipes. Or india-rubber may be compressed against the leak by such collars.

[Printed, 8*d*. Drawing.]

A.D. 1865, October 10.—N° 2614.

ABELL, Richard.—(*Provisional protection only.*)—Trapping and ventilating sewers.

The street gully is fitted with a trap apparatus, through which water is allowed to descend into the sewer and gas to pass out disinfected. The disinfecting is performed by means of charcoal contained in a cage-like receptacle fitted to the trap. "The trap and charcoal receptacle is made to lift out readily, "a suitable receptacle is made for solid matters below the "gully into which the solids and fluids first fall, the fluid "matters passing off by a side passage to the trap, and thence "by the channel to the drain, an upper or second side opening "is made for the disinfected gas to pass from the trap chamber "to the gully chamber, escaping thence by the gully grating, "this upper passage may be closed if desired when the lower "one becomes a close trap for the gully." A forked pipe or system of double pipes is used to put the trap into communication with the sewer; one pipe conducts the gas from the crown of the sewer, the other serves as a conduit for water in the usual manner. Instead of using the same trap "separate "traps may be used, one for the gully and another for the "gases."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 21.—N° 2728.

ROBERTS, Isaac.—Pipe, &c. machinery.

The clay or earth is placed in a tapering or cylindrical vessel built up of skeleton bars, and having within it a shaft bearing arms or blades. By the rotation of this shaft the clay is forced out through the intervals between the bars, and falls on a plate outside, the stones and other refuse being discharged at the bottom of the vessel.

The plate upon which the clay falls, is provided with one or more ports or openings, leading to the clay chamber. A scraper collects the clay from the plate into the chamber. From the chamber the clay is forced through moulding orifices of the desired shape. This forcing is accomplished by using "for each clay port and moulding orifice two slides, the one "to shut off and open alternately the clay supply port, and "the other to act reciprocally as a ram or plunger, to force "the clay through the moulding or shaping orifice when the "first slide has shut off the supply. These slides are worked "from cranks or eccentrics on the rotating shaft above "mentioned."

[Printed, 1*s*. 4*d*. Drawings.]

1866.

A.D. 1866, January 29.—N° 286.

ROBERTSON, JAMES.—Cutting drains.

Part of this invention has reference to various forms of dredging and excavating machinery, in which currents of water or air at high speeds are used, and various devices, such as large hollow rollers, are adapted for the removal of the excavated matter.

Another part relates to the construction of wedge-shaped rolls or rotating cutters for making drains on land. These rolls or cutters roll on an axis guided by broad wheels, or roll along the ground without any axis, being fitted in fact to the periphery of a large hollow cylinder or drum. Where one wheel with an axis is used it is made of large diameter, and is rolled along the course of the proposed drain and is caused to wedge itself into the ground by its own weight. When a greater proportionate depth of drain is required, the cutter wheel has no boss, but is guided by friction pulleys running inside its periphery, while another pulley working externally transmits the motive power. When the ground is very soft, the cutter is supported by the cylinder or drum above mentioned, and when the ground is hard and greater pressure is required the drum may be weighted with water. When the machine is to be moved from place to place the cutters are detached. A modification of the machine is also described, which is intended to be used for marshy places, where there *is a tendency in* the drain to close behind the cutter. In this machine the cutter is contrived to carry short lengths of drain pipes on its periphery, which it forces into the ground and leaves at the bottom of the drain. These drain pipes are of fire-clay, cast-iron, or other strong materials, The cutting apparatus it also described in some cases, as being supported on an eccentric or cranked axis, supported by wheels, running on the surface of the ground. To regulate the depth of cut, the cranked axis is adjusted by worm wheels or other means. Other methods of depressing the cutters may be used.

Various methods of propulsion by horse and steam power are described.

[Printed, 6*s*. Drawings.]

A.D. 1866, February 24.—N° 576.

SPENCER, Thomas.—Earthenware pipes, &c.

This invention partly relates to an improvement upon the machinery for making pipes, &c., for which Letters Patent were granted to the present inventor A.D. 1848 (No. 12,115) and A.D. 1861, (No. 470.)

"According to the arrangement therein specified it was " necessary to change the die plates for each different size of " pipe." It is now proposed "to avoid this by providing a " fixed die plate with guides or slides to receive different sizes " of shells or external moulds, the said guide plates being " sufficiently wide apart to hold the largest shell, the latter " being also provided with flanges or side plates to correspond. " The opening in the die plates through which the clay " descends" is constructed "when necessary with loose rings " fitted to the said plate which rings being concentric to each " other may be varied in number according to the aperture " required, and in like manner the core may be regulated."

[Printed, 10*d*. Drawing.]

A.D. 1866, April 2.—N° 941.

BROOKE, Edward, the younger.—Ventilating sewers.

This invention relates to improvements upon those described in Specification No. 2451, A.D. 1865.

It consists in combining in various ways with the trapped gullies, ventilating apertures fitted with perforated chambers or trays containing charcoal or other disinfectant. The foul air of the sewer is unable to pass by the trapped inlet, but only through the aperture fitted as above. The bend or branch pipe may, if desired, be divided into an air passage and a sewage passage by means of a mid-feather, the former passage being fitted with the disinfectant receptacle.

A modification of this system is shown, by which the sewer gases are enabled to pass, deodorized from the sewer up the rain water stand pipes of the houses.

[Printed, 10*d*. Drawing.]

A.D. 1866, April 10.—N° 1026.

SHINNER, George William.—(*Provisional protection only.*)—Utilising sewage.

The main sewer is fitted with branches which convey the sewage to the building wherein the separating process is carried out. The branches, before entering the building, " are passed through a reservoir for the purpose of dis- " charging the contents of the sewer on the occurrence of a " storm or heavy fall of rain; this is effected by means of a " valve in the branch passing through the reservoir." The sewage is received in strainers placed in brick tanks, from which the liquid sewage passes by overflow, into filter beds and thence to the drain. The strainers are raised at intervals from the tanks and removed for emptying.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 12.—N° 1037.

ABEL, Charles Denton.—(*A communication from Johann Peter Wilhelm Schmick.*)—(*Provisional protection only.*)—System of drainage.

A system of pipes is laid, independently of the sewers, and placed in connection by branch pipes with the tanks or reservoirs of the closets in the houses. The branch pipes are furnished with valves, which, at given intervals, are consecutively opened to allow the sewage to be drawn into the main pipe and thence conducted to suitable reservoirs. Pumping apparatus is provided by means of which the partial vacuum is created in the pipes, and the sewage pumped or water turned in to flush the pipes.

[*Printed, 4d.* No Drawings.]

A.D. 1866, April 14.—Nº 1057.

MURRAY, Charles Henry, and JENNINGS, Mathew.—Pipe, &c. making machinery.

This machinery is intended to be used in the manufacture of pipes, bricks, &c. of clay and also for compressing peat. The clay is fed from a hopper between two rollers, which force it down into a box wherein are two deeply grooved or ribbed rollers, working in opposite directions. The clay is taken by these rollers and forced into the die channels, and as the ribs and grooves take into one another, the clay is squeezed out of the grooves. The dies are furnished with lubricating apparatus. Wire cutting frames are also provided.

[Printed, 10*d.* Drawing.]

A.D. 1866, April 27.—Nº 1194.

DIXCEE, Thomas.—Cutting apparatus for pipe, &c. machines.

The invention consists in adapting supports to the cutting apparatus, for the purpose of sustaining the plastic articles during the cutting operation. "It is preferred that each set " or series of supports should be fixed to a bar having guides " which enable it to slide to and from the stream of clay or " material. The cutting wires are fixed in a frame turning at " its lower end on centres below the stream of clay or material, " and when the frame is moved from one side to the other on " these centres the wires pass through the clay or material; " this frame as it moves in either direction acts on weighted " levers with inclines on them, and lifts them, and the levers " being linked with the sliding bars carrying the supports, " these bars are drawn inwards until the supports press " laterally against the bricks or articles; this takes place " immediately before the wires commence to cut, and imme- " diately the wires have passed through the clay or material " the weighted levers fall down and the supports move back " away from the bricks or articles."

[Printed, 10*d.* Drawing.]

A.D. 1866, May 11.—Nº 1351.

AUSTIN, William.—Joining sewage, &c. pipes.

The joint is made by means of a socket and packing. To prevent the pipes drawing apart these are made with grooves

A.D. 1866, September 12.—N° 2346.

WHEELHOUSE, Thomas. — Disinfecting sewers, draining ashpits, &c.

To the water mains are attached at intervals upright branch pipes, which open into chambers placed under the level of the street, the top being gridded. The chamber is partly filled with some disinfectant, and at a certain distance above the bottom a pipe leads from it to the sewer. When communication with the main is opened water flows into the chamber, takes up some of the disinfectant and passes into the sewer.

The invention also consists in fitting grated bottoms to ashpits and like places, through which liquids pass off to the sewer, leaving the ashes dry for removal. Waste water from hydrants is also taken through pipes to privies for flushing purposes.

[Printed, 8*d*. Drawing.]

A.D. 1866, October 3.—N° 2532.

CAVANAH, James.—Soil traps, &c.

Part of this invention relates to valves for water-closets, cisterns, &c; the remainder has reference to an improved soil trap, which may be constructed of any suitable material, The trap is constructed with an opening in the top or other convenient parts, such opening being fitted with an air-tight cover. By means of this opening the trap can be cleaned out, and through it the drain, when necessary, can be flushed.

[Printed, 8*d*. Drawing.]

A.D. 1866, October 9.—N° 2606.

SHINNER, George William. — Separating and utilizing sewage.

The sewer is constructed with branches, which pass through reservoirs and are therein fitted with valves by means of which the sewer is relieved in the event of storms. The branches are then brought to a building where they empty the sewage into wire cages or strainers held in tanks. Overflowing from the tanks the liquid sewage passes to filter beds and thence to a drain.

[Printed, 8d. Drawing.]

A.D. 1866, October 16.—Nº 2675.

WOODWARD, Thomas.—Raising sewage, &c.

This invention relates to apparatus for "raising or elevating "sewage matters," &c. "in order that they may be discharged "by pipes or drain tubes to any desired place, the apparatus "being also applicable as a means of affording motive power "from water by elevating water to a considerable altitude."

The sewage is conducted into a reservoir placed at the edge of a tidal water. From this reservoir it is raised by archimedean screw tubes, which are rotated by gearing put in motion by the rise and fall of a floating body in the tide way.

[Printed, 8*d*. Drawing.]

A.D. 1866, December 19.—Nº 3332.

BUXTON, Samuel.—Stench trap.

To the waste pipe is fitted a receiver containing a conical valve fitting in an accurately ground seating. To the valve is attached a float, or the valve may serve the double purpose of float and valve, so that when water flows down the waste pipe into the receiver, the valve is raised from the seat and allows the water to pass out into the drain. When the water has so passed away the float and valve subside and close the mouth of the drain.

[Printed, 8*d*. Drawing.]

Dies for pipes, &c.—*cont.*

Weller, 26.
Beart, 28.
Benson, 29.
Ransome and Warren, 30.
Franklin, 31.
Martin, 34.
Whishaw, 35.
Spencer, 36.
Tooth, 39.
Jacob, 39.
Whaley and Lightoller, 41.
Burton, 42.
Oates, 49.
Clayton, 51.
Oates, 51.
Schottlander (*Schott*), 58.
Cliff, 59.
Uren, 62.
Whitton and Whitton, 64.
Hudson and Hudson, 65.
Whitaker and Walmsley, 67.
Whitehead, 69.
Sprot and Denholm, 71.
Samuelson, 71.
Heritage, 72.
Grimsley, 72.
Hill and Thomson, 73.
Chamberlain, 76.
Oates, 81.
Knight and Stubbs, 87.
Gibson, 91.
Walker, 92.
Percy and Craven, 94.
Hill, 95.
Sanders, 95.
Pearce, 96.
Tooth, 97.
Grey, 103.
Gibson, 107.
Eccles, 110.
Wimball, 112.
Mareschal, 112.
Brethon, 114.
Oates, 119.
Harland, 120.
Wimball, 121.
Doulton, 122.
Harland, 124.
Wimball, 125.
Rowcliffe, 127.
Salomon-Cohen, 128.
Pitman, 131.
Eccles, 145.
Cookson and Homer, 148.
Eccles, 149.
Basford, 150.
Geyelin, 151.
Percy, 156.
Armour, 166.
Sharp and Bulmer, 167.
Spencer and Robinson (*Delafol*), 174.
Dobson, 198.
Spencer, 207.
Murray and Jennings, 209.

Disinfecting sewers :

Gilbee, 54.
Macpherson, 70, 79.
Vertue, 111.
Chisholm, 137.
Dales, 151.
Mangles, 158.
Baker and Friend, 189.
Smith, 200.
Brooke, 203.
Wheelhouse, 212.

Drain pipes. *See* **Pipes.**

Drains and sewers, consti ing :

Shotbolte, 1.
Scott, Clarkson, Tatham, Mellish, 7.
Williams, 12.
Viney, 13.
Lees, 14.
Kerr, 17.
Basford, 20.
Cassell, 25.
Percy, 29.
Tooth, 39.
Piron, 40.
Page, 47.
McGlashen, 52.
Peacock, 53.
Johnson, 55.
Perkes, 55.
Rogers, 57.
Schottlander (*Schott*), 58.
Birch and Birch, 59.
Jennings, 61.
Stanford, 63.
Dundonald, Earl of, 68.
Stanford, 72.
Bruck, 72.
Storey, 78.
Woodhouse, 79.
Fontainemoreau, 81.
Stevens, 92.
Monk, 99.
Cochrane, 101.
Treeby, 111.
Richardson, 115.
Cowper, 116.
Treeby, 118.
Baylis, 118.
Rogers, 120.
Lipscombe, 122, 127.
Long, 130.
Jennings, 133.
Manning, 135.
Young and Brown, 135.
Baker, 135.
Crickmer, 138.
Fane, 138.
Taylor, 140.
Money, 144.
Gilbert, 157.
Rogers, 158.
Durand, 159.

Drains and sewers, &c.—*cont.*
  Hyde (stable drain), 161.
  Durand, 164.
  Rogers, 165.
  Strangman, 169.
  Footman, 178.
  Nicholl, 179.
  Mallet, 187.
  Abel (*Schmick*), 208.

Excavating and cutting machinery. *See also* "Boring ground for drains."
  Shotbolte, 1.
  Driver, 6.
  Seller, 26.
  Paul, 33.
  Fowler, 45.
  Cotgreave, 46.
  Fowler, 48.
  McGlashen, 52.
  Paul, 62.
  Johnson, 67.
  Wilson, 69.
  Barrat and Barrat, 109.
  Brooman, 116.
  Barrat and Barrat, 136.
  Savage, 148.
  Gibson and Gibson, 151.
  Gilbert, 157.
  Clark (*Scott, Brayley, and Pitts*), 171.
  Rérolle, 173.
  Robertson, 206.

Flushing and cleansing sewers, &c.:
  Shotbolte, 1.
  Farish, 15.
  Ashe, 32.
  Taylor, 34.
  Hormer, 36.
  Salter, 37.
  Burton, 44.
  Page, 47.
  Perkes, 55.
  Blades, 61.
  Adamson, 65.
  Gray, 75.
  Manwaring and Summers, 83.
  Gray, 89.
  Elliott, 110.
  Wilkins, 115.
  Long, 130.
  Crickmer, 138.
  Rogers (removing stoppage), 158.
  Hyde, 161.
  Rogers (removing stoppage), 165.
  Fricker and Manley, 174.
  Manwaring, 176.
  Lovegrove (removing obstruction), 178.

Flushing and cleansing sewers, &c.—*cont.*
  Birch (removing obstruction), 180.
  Taylor (removing obstruction), 183.
  Jones, 184.
  Bonneville (*Melotte*), 188.
  Tomlison, 191.
  Wheelhouse, 212.

Glazing pipes, &c.:
  Lindslee, 4.
  Hinde, 85.
  Forrester, 187.

Grids for drains &c. *See also* Traps.
  Mellor, 107.
  Greaves, 143.
  Easton and Amos, 144.
  Sharp, 194.

Gutters
  Deutsche, 19.
  Basford, 20.
  Tooth, 39.
  Beaumont, 66.
  Callan, 74.
  Brown, 86.
  Callan, 88.
  Cotsell, 100.
  Gedge (*Blanchefort*), 103.
  Dumas (*Arnaud*), 106.
  Cottam and Cottam, 126.
  Steven, Reid and Frew, 132.
  Mark, 133.
  Greaves, 143.
  Tenwick, 152.
  Ramspacher and Schmidt, 154.
  Newbold, 159.
  Collyer, 160.
  Macfarlane, 163.
  Blakeley and Blakeley, 164.
  Griffiths (cement), 169.
  Effertz, 172.
  Clark, 196.
  Pettit, 198.

Inspecting drains, sewers, &c.:
  Barnes, 201, 203.

Joining pipes:
  Docker, 7.
  Bell, 9.
  Hill, 10.
  Francis and Waters, 11.
  Read, 11.
  Bagshaw, 14.
  Roe, 27.
  Beart, 28.
  Martin, 32.
  Whishaw, 35.
  Rowe, 38.

Joining pipes—*cont.*
  Burton, 42, 44.
  Mayo, 45.
  Clayton, 51.
  Dundonald, Earl of, 56.
  Birch and Birch, 59.
  Green, 60.
  Blanchard, 65.
  Dundonald, Earl of, 68.
  Rovère, 75.
  Moseley, 81.
  Jennings, 82.
  Doulton, 84.
  Blackburn, 85.
  Cooper, 90.
  Hill, 93.
  Hide, 98.
  Pidding, 99.
  Jennings, 101.
  Austin, 112.
  Roberts, 113.
  Padgett, 125.
  Turner and Turner, 129.
  Gee, 131.
  Cookson and Homer, 148.
  Richardson, 161.
  Higginbottom, 164.
  Hewitt, 175.
  Newton, 177.
  Creeke, 178.
  Gore, 183.
  Hargreaves, 186.
  Mulholland, 189.
  Cotterill, 202, 204.
  Austin, 209.

Moulding and casting pipes:
  Elliot (clay pipes), 46.
  Clarke (core barrels), 146.
  Buckwell, 163.
  Mulholland, 189.

Pipe and tile making machinery. *See also* "Cutting "apparatus for pipe, &c. "machinery;" also "Dies "for pipe making."
  Etherington, 1.
  Edwards, 2.
  Bell, 9.
  Dayerlein, 10.
  Read, 11.
  Busk and Harvey, 12.
  Bagshaw, 14.
  Clark, Nash, and Longbottom, 15.
  Tweeddale, Marquis of, 16, 17.
  Ainslie, 18.
  Etheredge, 19.
  Clayton, 21.
  Denton, 22.
  Ford, 23.
  Smith and Jolly, 23.
  Ainslie, 26.

Pipe and tile making machinery—*cont.*
  Weller, 26.
  Beart, 28.
  Benson, 29.
  Percy, 29.
  Ransome and Warren, 30.
  Franklin, 31.
  Ridgway, 34.
  Martin, 34.
  Whishaw, 35.
  Spencer, 36.
  Tooth, 39.
  Jacob, 39.
  Whaley and Lightoller, 41.
  Burton, 42.
  Oates, 49, 51.
  Schottander (*Schott*), 58.
  Cliffe, 59.
  Uren, 62.
  Whitehouse and Whitehouse, 62.
  Whitton and Whitton, 64.
  Hudson and Hudson, 65.
  Whitaker and Walmsley, 67.
  Sprot and Denholm, 71.
  Samuelson, 71.
  Grimsley, 72.
  Hill and Thomson, 73.
  Smith, 75.
  Chamberlain, 76.
  Oates, 81.
  Byerley, 86.
  Knight and Stubbs, 87.
  Uren, 88.
  Gibson, 91.
  Walker, 92.
  Percy and Craven, 94.
  Hill, 95.
  Sanders, 95.
  Tooth, 97.
  Effertz, 99.
  Schlickeysen, 100.
  Grey, 103.
  Downie, 106.
  Gibson, 107.
  Eccles, 110.
  Wimball, 112.
  Mareschal, 112.
  Brethon, 114.
  Thornton, 117.
  Smith, Cadman, and Cadman, 118.
  Oates, 119.
  Harland, 120.
  Wimball, 121.
  Lethuillier, 121.
  Lewis, 123.
  Harland, 124.
  Wimball, 125.
  Rowcliffe, 127.
  Salomon-Cohen, 128.
  Pitman, 131.
  Smith, 137.
  Eccles, 145.
  Cookson and Homer, 148.

Pipe and tile making machinery—*cont.*
  Eccles, 149.
  Geyelin, 151.
  Percy, 156.
  Eccles, 158.
  Jardin and Girard, 161.
  Wimball, 162.
  Neame, 165.
  Sharp and Bulmer, 167.
  Spencer, 168.
  Effertz, 172.
  Davey, 172.
  Spencer and Robinson (*Delafol*), 174.
  Percy, 174.
  Holland, 179.
  Effertz, 181.
  Cowley 182.
  Jones, 184.
  Bond and Bond, 190.
  Jones, 192.
  Effertz, 196.
  Dobson, 198.
  Brown, 199.
  Smith, 199.
  Roberts, 205.
  Murray and Jennings, 209.

Pipes, bitumenous :
  Marbell, 5.
  Deutsche, 19.
  Cassell, 25.
  Dundonald, Earl of, 49, 56.
  Bellford, 63.
  Blackburn, 85.
  Newbold, 159.
  Collyer, 160.
  Rhodes, 175.
  Hargreaves, 176.
  Empson, 196.

Pipes, composition for :
  Lindslee, 4.
  Kerr, 17.
  Deutsche, 19.
  Cassell, 25.
  Pidding, 50.
  Petrie, 108.
  Ponton, 170.
  Peterson, 188.
  Cotterell, 210.

Pipes, concrete and cement. *See also* "Pipes, composition for."
  Piron, 40.
  Jennings, 61.
  Bruck, 72.
  Fontainemoreau, 81.
  Waite, 83.
  Blackburn, 85.
  Clark (*Pollard*), 134.
  Coignet, 152.
  Cotterill, 210.

Pipes, drain, substitute for :
  Fowler, 45.
  Norton, 98.

Pipes, earthenware :
  Lindslee, 4.
  Bell, 9.
  Francis and Waters, 11.
  Read, 11.
  Bagshaw, 14.
  Watson, 19.
  Clayton, 21.
  Ford, 23.
  Smith and Jolly, 23.
  Weller, 26.
  Beart, 28.
  Percy, 29.
  Ransome and Warren, 30.
  Whishaw, 35.
  Spencer, 36.
  Tooth, 39.
  Jacob, 39.
  Burton, 42.
  Wilson, 42.
  Elliot, 46.
  Clayton, 51.
  Mackay, 64.
  Blanchard, 65.
  Beaumont, 66.
  Shoebridge, 68.
  Whitehead, 69.
  Sprot and Denholm, 71.
  Hill and Thomson, 73.
  Austin, 77.
  Jennings, 82.
  Livingston, 84.
  Cooper, 90.
  Hill, 93.
  Margueritte, 96.
  Kersey, 104, 105.
  Gardissal, 109.
  Townsend, 114.
  Doulton, 122.
  Creeke, 124.
  Padgett, 125.
  Stiff, 129.
  Northern, 139.
  Wilkins, 147.
  Cookson and Homer, 148.
  Spencer and Robinson (*Delafol*), 174.
  Hewitt, 175.
  Newton, 177.
  Creeke, 178.
  Lovegrove, 178.
  Hargreaves, 186.
  Cotterill, 211.

Pipes, flexible :
  Hooper, 8.
  Ramspacher and Schmidt (new fabric), 154.

Pipes, glass :
  Roe, 27.
  Austin 77.

- Pipes, glass—*cont.*
  - Pidding, 98.
  - Turner and Turner, 129.
- Pipes of peat :
  - Smith and Jolly, 23.
  - Lethuillier, 121.
  - Kelly, 187.
- Pipes, perforated :
  - Watson, 19.
  - Percy, 29.
  - Fowler (wood pipes), 45, 48.
  - Shoebridge (openings and covers), 68.
  - Abraham, 91.
- Pipes of slag. *See also* "Pipes of stone."
  - Elliott, 54.
  - Smith, Bessemer, and Longsdon, 89.
  - Short, Smeeton, and Bowler, 152.
  - Harrison, 197.
- Pipes of stone :
  - Moore, 3.
  - Tuite, 4.
  - Docker, 7.
  - Wright, 8.
  - Murdock, 10.
  - Hill, 10.
  - Adcock (fused stone), 50.
  - Fontainemoreau, 96.
- Pipes of wood :
  - Wright, 8.
  - Bell, 9.
  - Fowler, 45, 48.
- Ploughs for draining. *See also* "Excavating and cutting machinery."
  - Fowler, 45.
  - Cotgreave, 46.
  - Fowler, 48.
  - Dundonald, Earl of, 68.
- Preserving iron sewage pipes :
  - Kemp, 160.
- Rain-water spouts and pipes :
  - Wyatt, 6.
  - Hobson, Sylvester, and Moorhouse, 8.
  - Basford, 20.
  - Bellford, 63.
  - Beaumont, 66.
  - Callan, 74.
  - Brown, 86.
  - Callan, 88.
  - Pidding, 98.
  - Macfarlane, 104.
- Rain-water spouts and pipes —*cont.*
  - Downie, 106.
  - Steven, Reid, and Frew, 132.
  - Whitelaw, 145.
  - Clarke (core barrels), 146.
  - Macfarlane, 163.
  - Blakeley, and Blakeley, 164.
  - Taylor, 183.
- Raising earth from sewers :
  - Bragg and Bridgeman, 197.
- Raising sewage :
  - Loam, 146.
  - Maguire, 150.
  - Walker, 181.
  - Husband and Quick, 182.
  - Jones, 184.
  - Woodward, 213.
- Roads, embankments, &c., draining :
  - Watson, 19.
  - Adams, 49.
  - Dunn and Watts, 57.
  - Gibson, 69.
  - Greaves, 143.
- Sewage, collecting and separating. *See also* "Drains "and sewers, constructing;" and "Raising sewage."
  - Macpherson, 70, 79.
  - Manning, 135.
  - Young and Brown, 135.
  - Crickmer, 138.
  - Fane, 138.
  - Chapusot (emptying sewers), 141.
  - Jones, 141.
  - Brownlie, 154.
  - Walker, 155.
  - Shaw, 155.
  - Nicholl, 179.
  - Walker, 181.
  - Fletcher, 184.
  - Chesshire, 186.
  - Baker and Friend, 189.
  - Skinner, 208.
  - Austin, 211.
  - Skinner, 212.
- Ship's sewer :
  - Robinson, 134.
- Sleepers for draining railways :
  - Dunn and Watts, 57.
- Slope of drains, ascertaining :
  - Gillespie, 52.

Subways for sewers, &c.:
Williams, 12.
Baylis, 118.

Syphons for sewage :
Treeby, 118, 121.
Clarke, 147.
Clark (*Triballat*), 182.
Barker, 192.

Tiles for draining. *See also* "Pipes, earthenware."
Clark, Nash, and Longbottom, 15.
Beart, 16.
Tweedale, Marquis of, 16, 17.
Ainslie, 18.
Irving, 18.
Basford, 20.
Clayton, 21.
Denton, 22.
Wilson, 22.
Ford, 23.
Smith and Jolly, 23.
Ainslie, 26.
Weller, 26.
Beart, 28.
Hall, 28.
Benson, 29.
Percy, 29.
Ransome and Warren, 30.
Franklin, 31.
Martin, 34.
Tooth, 39.
Whaley and Lightoller, 41.
Burton, 42.
Savage, 197.

Traps and valves for drains, &c.:
Gaittait, 5.
Hawkins, 12.
Viney, 13.
Smith, 29.
Hale, 31.
Martin, 32.
Thompson, 40.
Marsden, 43.
Lowe, 43.
Dixon, 47.
Jennings, 53.
Stanford, 63, 72.
Austin, 77.
Storey, 78.
Batten, 80.
Storey, 83.
Rawlinson, 90.
Lewis, 94.
Youtman, 108.
Treeby, 111.
Cottam and Cottam, 126.
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7. Navigation improved; or the art of rowing ships of all rates in calms with a more easy, swift, and steady motion than oars can. By THOMAS SAVERY. (*Letters Patent, No.* 347, *dated* 10*th January* 1696.) Price 1s.; by post, 1s. 0½d.

8. The Miner's Friend; or an engine to raise water by fire, described, &c. By THOMAS SAVERY. (*Letters Patent, No.* 356, *dated* 25*th July* 1698, *and Stat.* 10 & 11 *Will. III. No.* 61, *A.D.* 1699.) Price 1s.; by post, 1s. 1d.

9. Specimina Ichnographica; or a brief narrative of several new inventions and experiments, particularly the navigating a ship in a calm, &c. By JOHN ALLEN, M.D. (*Letters Patent, No.* 513, *dated* 7*th August* 1729.) Price 8d.; by post, 9d.

10. A description and draught of a new-invented Machine for carrying vessels or ships out of or into any harbour, port, or river against wind and tide, or in a calm, &c. By JONATHAN HULLS. (*Letters Patent, No.* 556, *dated* 21*st December* 1736.) Price 8d.; by post, 9d.

11. An historical account of a new method for extracting the foul air out of ships, &c., with the description and draught of the machines by which it is performed, &c. By SAMUEL SUTTON, the Inventor. To which are annexed two relations given thereof to the Royal Society by Dr. Mead and Mr. Watson. (*Letters Patent, No.* 602, *dated* 16*th March* 1744.) Price 1s.; by post, 1s. 1d.

12. The letter of Master WILLIAM DRUMMOND for the construction of machines, weapons, and engines of war for attack or defence by land or sea, &c. Dated the 29th September 1626. (*Scotch Patent, temp. Car. II.*) Price 4d.; by post, 4½d.

13. Contributions to the History of the Steam Engine, being two deeds relating to the erection by Messrs. Boulton and Watt of steam engines on the United Mines at Gwennap, Cornwall, and at Werneth Colliery, near Oldham, Lancashire. From the originals in the Patent Office Library. Price 10d., by post, 10½d.

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